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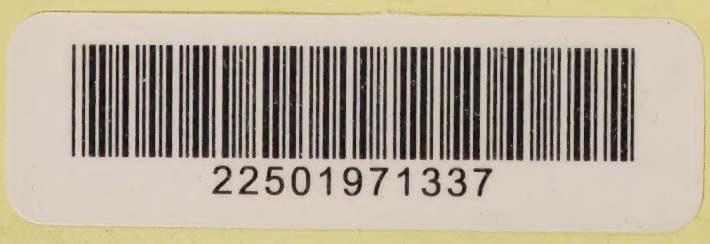

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PUBLIC HEALTH.

REPORTS

OF

THE MEDICAL OFFICER OF THE PRIVY COUNCIL AND LOCAL GOVERNMENT BOARD.

NEW SERIES, No. V.

PAPERS, CONCERNING THE EUROPEAN RELATIONS OF ASIATIC CHOLERA, SUBMITTED TO THE LOCAL GOVERNMENT BOARD IN SUPPLEMENT TO THE ANNUAL REPORT OF THE PRESENT YEAR. 1875

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To the Right Honorable George Sclater-Booth, M.P.,
President of the Local Government Board.

Medical Officer's Report.

Sir,

In supplement to my recent Annual Report, I have now the honour of submitting to you (App. No. 1) the paper which I mentioned in that Report as at the time under preparation by Mr. Netten Radcliffe: setting forth the results of his laborious and instructive study of the international relations of Asiatic Cholera during the past ten years.

During that space of time, Asiatic Cholera made great ravages in other quarters of the globe than Asia; and especially as regarded our own quarter, the epidemic inroads of the disease were such that twice in the decennium the several European Governments consulted together in congress as to the possibility of better defending their States against a danger which seemed of growing importance. Of the two International Conferences to which I refer, one, lasting for more than seven months, was held at Constantinople in 1866; and the other, lasting for a month, was held last year at Vienna. The former was convened at the instance of the French Government with reference to the great pestilential invasion which in 1865 had radiated from Alexandria to all parts of Europe; the latter was convened at the instance of the Austro-Hungarian Government, with reference to the state of cholera in Europe during the years 1870–4. For an account of the more elaborate proceedings of the conference of 1866 I can only refer to the two valuable volumes in which the *Procès Verbaux* (including the reports of the Committees) of that Conference were published. For a full account of the proceedings of the second Conference, it is of course also necessary to refer to the published volume of *Procès Verbaux;* but, for more convenient reference on the present occasion, Dr. Seaton, who, with Dr. Dickson of Constantinople, attended the Conference on behalf of Her Majesty's Government, has, at my request, favoured me with the annexed brief abstract of the proceedings.—See App. No. 2.

Recent facts as to cholera in Europe have undoubtedly been of very evil omen. Europe, within the ten years' time, has twice been over-run with cholera. From the middle of 1865, when one great diffusion of the disease began, till after the middle of 1874, when a second great diffusion had apparently run its course, there possibly was no moment at which the disease was extinct in Europe, and there certainly was but little time when it could even be supposed to be extinct. It is true that, just at the end of 1868 and beginning of 1869, if traces were still remaining of the great diffusion which began in 1865, they were no longer publicly identified as such; but then, in the summer of 1869, began the second great diffusion, which was destined to have a five years' course. Whether or not there was latent continuity of process between those two great diffusions of cholera —whether the second of them began (as the phrase goes) in

"re-crudescence" of the first, or arose independently of it in a second invasive influence from Asia, has been matter of doubt among epidemiologists, and must perhaps remain undecided. Be that, however, as it may, the broad fact, concerning the nations of Europe, was that during the decennium 1865–74 Asiatic Cholera hardly ever ceased to more or less afflict or alarm them; and this fact, which, when duly understood, could not but suggest grave considerations as to the future, is receiving at the present moment a confirmation of its serious import in the circumstance that already, though only in the middle of 1875, cholera is reported to be again diffusing itself on the Syrian side of the Mediterranean.

Mr. Radcliffe's annexed paper is essentially narrative: telling facts which need no argument to emphasise their meaning; and, in submitting it to you, I would only beg leave to preface it with such few remarks as may help to define its practical bearings.

The special aim of the paper is to exhibit, with as precise detail as possible in regard of times and places, the various relations of cholera for the past ten years in this Western division of the Eastern Hemisphere: to show, as far as can be learnt, what local epidemics composed the total of each great diffusion; and in what order of time, and in what (if any) mutual connexion, they occurred; and in what (if any) way the local events were related to the circumstances of inter-local traffic. As regards the critical events of 1865, my annual report made to the Lords of the Council in 1866 had appended to it an excellent account then furnished by Mr. Radcliffe of such facts as were yet known; and the facts were likewise to some extent recorded by the Constantinople Conference of 1866; but, even as regards the events of 1865, Mr. Radcliffe is now able to add very materially to the knowledge which was possessed in 1866; and as regards all events subsequent to 1865, the evidence is now put together for the first time in Mr. Radcliffe's annexed paper.

The labour and difficulty of compiling such a record as Mr. Radcliffe has made are infinitely greater than persons who have never tried the same sort of work can well imagine. His raw material (consisting of all information received by different Departments of Her Majesty's Government with regard to the movements of cholera in foreign parts) has been of really immense quantity, but, though of such extent, has been often at first far too vague for scientific use, and has often failed to give essential facts; so that, before exact history could in any way be founded on the first material, much collateral inquiry has had to be undertaken; and occasionally long periods of time, even in some cases years, have elapsed before Mr. Radcliffe could succeed in getting certain links of evidence which were necessary to complete his record. Partly for this reason, and therefore unavoidably, Mr. Radcliffe's account of the second of the two great diffusions of cholera is far less elaborate than of the first; but, as a further reason for this difference, I may add that, when the one diffusion had been so exhaustively studied—studied

with a completeness perhaps never before attempted in regard of so large a passage of epidemiology, an equally detailed study of the other diffusion might, comparatively speaking, be dispensed with.

The practical results of Mr. Radcliffe's research are to be looked for in two directions: first, in the facts which are brought to light with regard to the influence of human intercourse in determining the diffusion of cholera; and secondly, in the inferences which arise with regard to the virtual illimitability of that influence (as between Asia and Europe) by measures of the nature of quarantine.

As regards the first matter, the evidence which Mr. Radcliffe exhibits is uniformly to one effect. So far as the extension of the disease could be followed in detail, it was found to have had definite relation to personal traffic: in various important cases the arrival of persons affected with the disease was unquestionably the starting point of local and perhaps national epidemics; and no extension of the disease was to be found, where the arrival of human beings from previously infected places was not either proven or probable.

It is important to appreciate those results in their negative as well as in their positive bearing. Detailed observation of particular outbreaks of cholera, and suggestions of analogy and experiment, have long led European pathologists to believe that the disease possesses great, though peculiar, power of spreading from the sick to the healthy; and Mr. Radcliffe, so far as he shews that particular cholera-epidemics have been started by imported cases of the disease, furnishes only additional illustration of that now (as I believe) unquestionable doctrine. But Mr. Radcliffe's other and merely negative result is in my opinion not less important: the result, namely, that in his very wide epidemiological study, extending from our own shores to the torrid climates of Africa and South-western Asia, he finds no reason to impute to cholera (outside the limits of India) any other mode of origination and extension than such as that doctrine expresses.

If, then, human contagion is the one active power in the international spread of cholera, is it possible so to restrict the intercourse between infected and non-infected countries as to prevent the spread of the contagion? Mr. Radcliffe's results, so far as I have quoted them, are eminently of a sort to suggest that question; but the impossibility of its being affirmatively answered was perhaps never so well illustrated as it is in parts of his paper.

In my above-quoted 8th Annual Report to the Lords of the Council, I entered at some length on the question, whether quarantine established at the ports of this country could be available to protect us against cholera: and I expressed a confident opinion that it could not. I submitted that quarantine, of a sort to be trusted in as a national defence, is not conceivable except in proportion as a people lives apart from the great highways of commerce, or is ready and able to treat its commerce as a subordinate political interest: that though undoubtedly quarantine, planned with the precision of a scientific experiment, and conducted with extreme rigour, may keep cholera out of places (such as remote and secluded islands) where the

extremely difficult conditions can be completely fulfilled, yet, under other circumstances, quarantine cannot reasonably be expected so to succeed, and must then be regarded as a mere irrational derangement of commerce. I presumed of course that our local authorities would individually have at command against the chances of cholera-importation the same powers of interference as against any dangerous infections of our own country, and that port-authorities might learn to exercise those powers in regard of evident arrivals of cholera in a way to confer at least some local service; but it seemed to me that, in the case of the United Kingdom, more than this could not be hoped for.*

That argument, primarily meant to apply to this country, might be expected to apply to other countries in proportion as they are commercial, or in proportion as great movements of population are kept up by other causes, as for instance in religious pilgrimages; and there are plenty of facts in Mr. Radcliffe's paper, to show how utterly futile against cholera were the quarantine-establishments of Europe in 1865. Egypt, aware early in May that illness of some sort was epidemic among the multitude of pilgrims then at Mecca, had provided that no returning pilgrims should disembark at Suez till their ships had undergone medical examination, and been found free from infectious disease; but during the latter half of May, ship after ship, bearing thousands of pilgrims, arrived at Suez without betraying any such evidence of disease as the authorities were prepared to consider a reason for quarantine; and Alexandria (as well as other parts of Egypt) received abundant choleraic infection from these arrivals, before any single case of cholera had been identified by the health-sentinels at Suez. Next, before Alexandria confessed itself to be infected, it had infected Marseilles; and through Marseilles it infected the rest of

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* "In order to illustrate this view [as I argued in the above-quoted report] the medical postulates of quarantine deserve to be considered in detail. Quarantine, purporting to be effectual, cannot rest satisfied with excluding from entry such persons as are obviously sick, but, indispensably for its purpose, must also refuse to admit the healthy, till they shall have passed in perfectly non-infectious circumstances at least as many days of probation as the disease can have days of incubation or latency: this condition often involving as its consequence that, if one case of disease arise among a number of persons in quarantine, the whole number of apparently-healthy must recommence their period of probation, and this perhaps again and again. Now, setting aside, as not essential to quarantine, the cruelties which its mal-administration involves, and which in practice are almost identified with its exercise: criticising only the conditions which quarantine, if it is to be effective, must involve: and, for the moment, not even counting as an objection the cost of that gigantic establishment which has to be permanently maintained in order to meet occasional exigencies, I here insist only upon the restrictions. Considering what they, when really carried into effect, must involve—what inconvenience to persons, what interruption to commerce, and on how vast a scale, and for what indefinite duration of time, no one can expect, in regard of great trading communities, that governments, if they go so far as to enact, will have much success in enforcing, quarantine. Against the efficiency of it, when enacted, there operate some of the strongest of all law-breaking influences; on the one hand, instincts of contempt for the narrow self-protectiveness which it represents, and, on the other, those eager commercial interests which now mainly govern the world. The latter, in proportion as they are affected, elude the restrictions which would embarrass them. Contraband of quarantine, like ordinary smuggling, is developed as soon as the inducements for it are considerable. And thus, practically speaking, where great commercial countries are concerned, it can scarcely be dreamt that quarantine-restrictions will be anything better than elaborate illustrations of leakiness."—8th Annual Report, page 41.

France. Then, before Marseilles confessed itself infected, Valencia had received a most disastrous infection from or through it; and from Valencia all Spain was infected. Odessa, before it was recognized as itself having cases of cholera, had let infection pass through it, first to start in Podolia an epidemic which diffused widely in South Russia, and secondly to start at Altenburg in the middle of Germany an epidemic which diffused widely in Central Europe. Italy received its infection through the quarantine-establishment of Ancona; which both infected the town of Ancona by sending infected things to be washed there, and also allowed an undiscovered case of cholera to pass on from its lazaret, after six days detention, to infect the town of Pistoia.

The above cases, which were before the Constantinople Conference, could give little encouragement to a belief that, when cholera is once current in Europe, the individual States can protect themselves against it by respectively quarantining each other; and accordingly the Constantinople Conference, though it approved the continuance of such quarantines, insisted far more on the very important advantages which would be gained to Europe at large if the States, acting collectively, would establish at the mouth of the Red Sea a joint quarantine against Asia. At the Vienna Conference, where, as Dr. Seaton's annexed abstract sets forth, the resolutions of the Constantinople Conference were more or less re-considered, that recommendation for a joint quarantine at Babelmandeb was not expressly renewed, and was not, Dr. Seaton says, meant for renewal, but it was not expressly renounced; and as the Conference clearly adhered in principle to the recommendation of strict cholera-quarantine against Asia, I would observe that Mr. Radcliffe contributes material of particular interest with reference to the proposal of 1866. The proposal started from a belief that the infection of 1865 had come into the Red Sea as a direct importation from the far East; but Mr. Radcliffe gives facts which I think are conclusive against the correctness of any such opinion. He shows that before the arrival at Jeddah of the particular ships which the Conference believed to have infected the Hedjaz, and thus to have started the great outbreak of 1865, cholera had for some time been extensively prevailing both in the Yemen and Hadramaut provinces of southern Arabia and also in the Somali country on the African side of the Gulf of Aden; that the ships in question, instead of having brought cholera from farther east, had probably contracted it at Makallah; but that at any rate quarantine at the mouth of the Red Sea would, if it had existed, have dealt only with one of the dangers of infection to which the Hedjaz was at the time exposed; and further that, apart from the infection of the Hedjaz, cholera, early in 1865, was steadily making its way from Beloochistan up the Persian Gulf and Euphrates valley, to invade Europe otherwise than through Egypt.

I have noted that the facts which Mr. Radcliffe tells with regard to the spread of cholera in Europe in 1865 say little for the value of such cholera-quarantines as any one European State can maintain against any other; and the practice of this country in respect

of cholera in Europe has long recognised that little or no control can be exercised at ports of arrival except as to persons who on medical inspection are found manifestly infected with the disease. Control to this limited extent, not pretending to efficiency as a measure of national defence, but able to be of some local value where local authorities are vigilant in exercising it, and in principle scarcely exceeding that which is exercised in respect of small-pox or fever, is what this kingdom has in place of quarantine: and it is satisfactory to read in Dr. Seaton's abstract of the proceedings of 1874 at Vienna, as compared with those of 1866 at Constantinople, how strongly the balance of European opinion is now inclining to the side of our English practice.

As regards the interest which the world at large has in the preventability of Asiatic Cholera, Mr. Radcliffe's present paper does not pretend to deal with more than one section of a very great subject-matter; but he has so treated this section as to give additional importance to the sections which lie logically next to it; and the reader who would appreciate it in that connexion, should briefly pass them in review.

Cholera, as a geographical subject-matter, divides itself for our practical purposes into three sections: (1) cholera, as existing in India; (2) cholera, as diffusing to other countries; and (3) cholera, as we here, in England or generally in Europe, see it from time to time epidemic among us.

Persons regarding exclusively the second of those sections, and seeing it as now displayed by Mr. Radcliffe, might at first take an almost fatalistic view of the immense mischief which cholera inflicts on mankind. For they see the disease diffusing itself as an attribute of such vast social movements as it is evidently impossible to control or minutely scrutinize: spreading itself, namely, in all directions in those constantly-moving streams of religious pilgrimage and commercial enterprise which constitute very large proportions of national life: and they see that a first, but unattainable, condition of dealing completely with a contagion thus distributed would be that they should be able to immobilize at their discretion the great tides of human life which convey it. They would no doubt see that the marine exportation of cholera from India may be considerably impeded by an enlightened and vigorous supervision of shipping, such as Her Majesty's Indian Government have designed under the Acts (constantly in course of amendment) which relate to native passenger-ships; but they would fear that, even if only in such movements of land-population as comparatively escape control, means must continue by which cholera existing in India will have ample facilities for extending to Europe; and they would recognise how the progress of circumstances is constantly making it less and less possible that, at times when cholera is present in any territory of Europe, the other territories should succeed in really protecting themselves against it by restrictions on international movement.

Undoubtedly, therefore, it is in directions which are outside the view of Mr. Radcliffe's present paper, that we must mainly look for

such hopes as can be entertained of dealing effectively with this great pestilence. We have to hope, on the one hand, that India may be made less productive of the infection: we have to hope, on the other, that other countries may be made less susceptible of it. And in each of these directions, there is room for very hopeful work.

Of the conditions which in Europe make local susceptibility to the infection of cholera, I have often had occasion to speak. That cholera, when imported into a locality, will under certain circumstances spread from the sick as from a centre, is among the certainties of medicine; but we know with at least equal certainty that its means of thus spreading are strictly limited, and the limiting conditions which are best known to us in regard of it are those which bring it into intimate analogy with our own enteric fever, and justify us in classing it as a Filth-Disease. On the preventability of cholera in this point of view, I have said so much on other occasions that I need not now insist on it, and would only refer to the general report which I had the honour of laying before you a year ago, on the subject of Filth-Diseases and their Prevention.* It cannot I think reasonably be doubted but that, as conditions of filth, and especially as filthy conditions of water-supply, are the main facilitating conditions for the dissemination of cholera in Europe, so they must be immensely potent influences in favouring the advance of cholera from station to station in successive epidemic outbreaks in the countries which lie between India and Europe; and it would seem certain that, along the whole succession of lands which transmit the streams of westward traffic from India, common hygienic vigilance in respect of those conditions may be of very great effect in impeding the diffusion of cholera.

Regarding cholera in India, apparently two sets of conditions have to be distinguished: (a) the conditions of the disease's endemic prevalence, in larger or smaller quantity, in a limited portion of the Indian continent, and (b) the conditions of its occasional spread over areas indefinitely larger.

That under the latter head must be counted at least in part the same property of contagiousness, and the same relation of this property to circumstances of filth, as we knew to be the essential conditions for the extension of the disease in Europe, is an opinion which European pathologists find it impossible not to entertain:† and so far as that European opinion holds good, the amount of cholera-diffusion in India is likely to be controlled by the same preventive measures as are certainly effectual for the like purpose in Europe. Those parts of the world therefore, which have had the habit of receiving cholera-infection from India, and especially those which have received it from secondary centres of infection, may expect to incur less and less of this danger in proportion as common sanitary government shall more and more bring within control the

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* Report, New Series, No. II.

† If this opinion is less generally entertained in India, or in parts of India, than it is in Europe, probably the difference of opinion is in great part only an expression of the fact that it must be more and more difficult to prove the contagiousness of the disease in proportion as studies on this point are made in places where the disease may be autochthonic

common Filth-Diseases of that vast country. And in this point of view it is most hopeful to know that for many past years, and even more rapidly than Europe has been able to appreciate her own interest in the sanitary progress of India, the British Government has been organising in that part of the empire such provisions for sanitary government as promise soon to compare not unfavourably with the present institutions of Europe itself.

The distinctive Indian problem, however, is that of the endemicity of cholera in part of the Indian area. It is from within British territory that this enemy of the human race sallies forth from time to time to do world-wide execution; and the first threat of each coming foray is that the disease is produced in greater quantity in the area to which it primarily belongs. There, in lower Bengal—specially in the Sunderbunds and other alluvial lands from Juggernauth to beyond the mouth of the Bhurmpooter, cholera is said to be as normal to the district as ague to the marsh-lands of Europe, and as definitely related to the seasons as if it were a fruit of the earth. To learn the conditions of that endemicity and its variations is a problem of the highest science; and to control them in the interests of mankind will be among the noblest administrative tasks which the responsibilities of empire have ever imposed. It would be foreign to my province to dwell upon this part of the subject: but I may permit myself to advert to the fact that Her Majesty's Government, now for some years past, has been promoting the study of cholera in India with the best lights of contemporary European knowledge: and no one will doubt but that here, as in other departments of medical research, truly scientific study must eventuate in practical good.

Briefly then,—if the constantly-developing and constantly-accelerating commerce between India and the rest of the world is not to carry with it a constantly-increasing terror of pestilence, the safeguards, I apprehend, will consist, not in contrivances of the nature of quarantine to maintain from time to time more or less seclusion of nation from nation, but rather in such progressive sanitary improvements on both sides as will reduce to a minimum on the one side the conditions which originate the infection, and on the other side the conditions which extend it. That cholera, as endemic and epidemic in India, will, even in the near future, be rendered by the exertions of the British Government far less terrible to Europe than it has been for the last half-century, is a conclusion which I think cannot fail to be entertained by those European epidemiologists who are conversant with the annual volumes, printed by order of the Secretary of State for India in Council, with regard to the measures adopted for sanitary improvements in India.

I am, Sir,
Your obedient Servant,

Medical Department,
July 28, 1875.

John Simon.

APPENDIX,

No. 1.—Report by Mr. Netten Radcliffe on the Diffusion of Cholera, and its Prevalence in Europe, during the Ten Years 1865–74.

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Preliminary.

Europe had been free from Asiatic cholera barely four years,* after fourteen years' uninterrupted presence of the disease, when in the summer of 1865 a new invasion took place. This invasion differed from preceding invasions in the direction of its approach and in the rapidity of its progress. The great epidemics beginning in 1830 and in 1847 respectively, had invaded the continent by way of Caucasia and

* The disease, after its invasion of Europe in 1847, appears to have lingered longest in Russia, and according to Dr. Arkhangelsky, in his work on the Cholera Epidemics of European Russia, 1823–72 (St. Petersburg, 1874, p. 197), that country became quite free after 10th July 1861.

the Caspian Sea; and each occupied 15 months in traversing the continent and reaching this country. The epidemic beginning in 1852 was, primarily at least, a recrudescence of the preceding epidemic. The epidemic beginning in 1865 invaded the continent by way of Egypt and the Mediterranean Sea, and in less than five months from its appearance at Alexandria, it had attacked numerous places along the whole coast-line of southern and eastern Europe from Taganrog to Gibraltar, and had appeared at Southampton. It had penetrated also into the governments of Podolia and Kiev, in Russia, along the course of the Danube as high as Rustchuk, into the interior of European Turkey and of Piedmont, and to the suburbs of Paris.

Early in 1866, at the request of the Medical Officer, I prepared for the Lords of the Council a report on the sources and development of the invading cholera of 1865.* For the purpose of this report I was given access to the very important information received by the Foreign Office from Her Majesty's representatives in invaded districts, and communicated by the Secretary of State for Foreign Affairs to their Lordships. The report was chiefly successful in showing that no more mysterious agency was concerned in the rapid diffusion of the disease from Alexandria than steam navigation. All the sea-port towns earliest attacked were in direct communication with that city; and in every instance where the beginnings of the irruption had been investigated with any precision, there importation was obvious or so highly probable as to be well-nigh as certain. The report was less successful in showing the sources of the invading cholera, except in relation to Mecca and the pilgrimage there. An unusual number of pilgrims had gathered together at Mecca in 1865 in consequence of that year being a Mahommedan jubilee. The days set apart for the peculiar rites of the pilgrimage fell in the first week of May. During the performance of the rites cholera broke out among the assembled pilgrims with great destructiveness, and at the close of the pilgrimage the disease was carried by those pilgrims who returned homewards from Mecca by way of Jidda, the Red Sea, and Suez into Lower Egypt. The first of the returning pilgrims, 1,500 in number, crowded on board an English steam vessel, arrived off Suez on the 19th May 1865. They were disembarked on that or the following day, and with them cholera was also disembarked, carried ashore by, among others, the master of the vessel and his wife, both of whom sickened of the disease in Suez on the 21st May.

From Mecca to Suez the manner of diffusion of the malady was pretty clearly ascertained; and its subsequent diffusion in Lower Egypt and to Europe could be followed step by step. But the source from which Mecca became infected with cholera, and the original starting point of the diffusion were less apparent, and this part of my report I left confessedly imperfect. The undetermined questions here referred to, of much interest epidemiologically, became of considerable practical importance in the course of the proceedings of the International Sanitary Conference held at Constantinople in 1866. The Conference came to the conclusion that cholera had been introduced into the Hejaz in 1865, from Java and India (more accurately, according to its report, from Bengal), by pilgrim-carrying ships; and upon this conclusion they founded certain recommendations for diminishing the danger from cholera, primarily to the Hejaz, and secondarily to Europe, by the

* Report on the Sources and Development of the present Diffusion of Cholera in Europe. *8th Report of the Medical Officer* (1865), p. 306.

establishment of a sanitary or, in other words, quarantine station at the mouth of the Red Sea. The Conference did not appear to have had before it evidence of the epidemic activity of cholera in the Bombay Presidency in 1864 and the beginning of 1865, which would have suggested greater significance than the Conference attached to information submitted to it by the British medical delegates, Dr. E. D. Dickson and Dr. Goodeve, as to the probable existence of cholera in Yemen at the close of 1864. Neither does it appear to have had any suspicion of the existence of cholera in the Somali country and East Africa, prior to the appearance of the disease in the Hejaz. The facts stated in my report were sufficient to prove that the conclusion of the Conference of 1866, and the recommendation attached to it, should not be received without further inquiry ; but if it were to be understood (which Dr. Seaton informs me is not the case) that the International Sanitary Conference which met at Vienna in 1874, accepted (as the words of one of their resolutions might seem to imply) the recommendation of the Conference of 1866, regarding a sanitary establishment at the mouth of the Red Sea, this would show that the information which has been accumulated on this subject is still very imperfectly appreciated.

The knowledge which was available concerning cholera in East Africa when my report was written was of the most meagre description. I was long foiled in obtaining confirmation of the suspicion, expressed in that report, of the disease existing there early in 1865. It was not, indeed, until 1870, that I was enabled to obtain specific information on the subject. In that year an opportunity offered of asking assistance from the Right Reverend Bishop Tozer, of the Universities Central African Mission, and he very courteously gave me the invaluable help of inducing Dr. James Christie, the physician to the Sultan of Zanzibar, to give attention to the question which had foiled me. Dr. Christie, with infinite care and much local knowledge of places, languages, and persons, elicited the positive fact of prevalence of cholera in the Somali country early in 1865. Taking, moreover, a wider interest in the subject (stimulated no doubt by the terrible epidemic of cholera which had visited the Island of Zanzibar in 1869–70), he collected from native and other sources all accessible information regarding the different diffusions of cholera to which East Africa had been subject. This information, of peculiar epidemiological interest, and forming a wholly new chapter in the history of cholera, was communicated by Dr. Christie to the Epidemiological Society, partly in January 1871 and partly in February 1872,* and is published in detail in the Transactions of the Society. The movements of cholera in East Africa form a most instructive study with reference to the mode in which the disease is propagated from place to place, and Dr. Christie is still engaged in researches on this subject.†

The presence of cholera in the Somali country early in 1865 materially alters the question of the origin of that year's diffusion, as it was presented to the International Sanitary Conference of 1866, and imparts peculiar importance to the opinions of the British medical delegates, that cholera probably existed in Yemen at the close of 1864. The infection of the Hejaz in 1865, was subsequent to the infection of the Somali country. Both phenomena were obviously parts of the same

* *Transactions of the Epidemiological Society of London.* Vol. III. pt. 2, pp. 265–287.

† Dr. Christie has completed his researches, for the present, since this report was written and he has published them as an independent work entitled "*Cholera Epidemics in East Africa : an account of the several diffusions of the disease in that country from* 1821 *till* 1872." (London, 1876.)

principal diffusion, but the explanation adopted by the Conference as to the sources from which the Hejaz received infection is inadequate to explain the source from which the Somali country received it.

Preliminary.

It is now practicable to treat with some approach to accuracy the question of origin of that great diffusion of cholera which, so far as Europe is concerned, began in 1865; and it is important from the prominence which this question has received in recent efforts to promote measures of international hygiene, as also from its epidemiological interest, that it should receive full consideration.

My report in 1866 was necessarily limited, almost wholly, in addition to such facts as were then available regarding the origin of the outbreak of cholera in Mecca in the preceding year, to an account of the subsequent spread of the disease in the Levant and in Europe. Such account represents very imperfectly the influence of the pilgrimage of 1865 in the dissemination of cholera, and the importance of Mecca as a centre of epidemic diffusion, when great outbreaks of epidemic disease there concur with the pilgrimage. This early report requires to be supplemented by the additional information which has been obtained on the subject to which it refers since its publication.

In the present report I propose to set forth the facts now ascertained concerning the sources of the outbreak in Mecca in 1865, and discuss their significance; also to describe the diffusion of the disease along the various routes pursued by the pilgrims on their homeward return after the close of the pilgrimage. I propose, moreover, to indicate the progress of the epidemic in Europe subsequently to 1865, and to offer some observations on its recurrence in 1869–70. I have in view to bring together so much of the official information communicated to this Department, during the course of the epidemic, as may serve to throw additional light upon certain questions not adequately treated in published reports. I have no purpose of writing an exhaustive history of the epidemic. The reports which have been published in reference to the prevalence of the disease in several Continental States and in America, official and other, are very numerous. The more important of these are readily accessible, and I have no pretension to that command of languages which would be requisite for the digestion of the entire series, even if such digestion were consistent with my present object. There are, however, certain important questions relating to the epidemic which, as I have already intimated, may be elucidated by official information communicated to this Department, and it is to these questions, and to such other additional knowledge on the subject of the epidemic as may be gathered from official papers, that I devote this report, supplementing the official data with data derived from other sources only so far as may contribute to greater clearness of the questions treated.*

Origin of the diffusion of 1865. The first observed facts.

I. The Origin of the Diffusion of 1865.†

On the 28th February 1865, the British ship "North Wind," a sailing vessel, over 60 days out from Singapore, arrived at Jidda with

* The data given in this Report relating to the Ottoman Dominions are for the most part derived from reports prepared at frequent intervals during the diffusion by Dr. E. D. Dickson, the physician to Her Majesty's Embassy, Constantinople, and British delegate to the Ottoman General Board of Health. Dr. Dickson's long acquaintance with and large knowledge of Turkey, give to the data furnished by him quite an exceptional value. At the International Sanitary Conferences held respectively, the one in Constantinople in 1866, the other in Vienna in 1874, Dr. Dickson was one of the British representatives.

† In dealing with geographical proper names in this Report, I have chiefly followed the orthography of Keith Johnston's *Index Geographicus* (1864).

numerous Javanese pilgrims on board bound for Mecca. She had left Singapore in December 1864 ("a few days later" than the 13th), and had touched in the course of her voyage at Malacca, Penang, Pedir, Achin, Aleppy, Shehr, and Makallah, putting into the last-named port on the 11th February 1865, and leaving it on the 14th.

On the 8th March another British ship, the "Persia," also a sailing vessel, 85 days out from Singapore, arrived at Jidda. She carried many pilgrims for Mecca, principally Javanese, and had left Singapore on the 13th December 1864. In her course she touched at Aleppy and Makallah, being about 20 days on the voyage between the two places. She reached Makallah on the 13th February 1865, and left that port for Jidda on the 16th.

Both ships were visited severely by cholera after touching at Makallah. While in that port a brackish water (the only water procurable) had been obtained for ship's use, and the passengers and crews had indulged immoderately in an unwholesome kind of fish sold there. The disease, favoured, as the masters believed, by a prevalence of calms and fair winds, which prevented the efficient ventilation of the between decks, continued until the ships arrived opposite to Lith (about 100 miles south of Jidda) and met with the strong northerly winds constantly blowing at that season in this part of the Red Sea, when it ceased. The master of the "North Wind" reported 52 deaths from cholera among a total number of 632 passengers and crew; the master of the "Persia" 93 deaths, among a total number of 530 passengers and crew.

Nothing is known of the early history of the outbreak on board the "North Wind," except that it began after the ship had touched at Makallah. Of the commencement of the outbreak on board the "Persia" there are two statements, both made twelve months after the occurrences described, one by the master of the vessel to Mr. Raby, Her Majesty's Consul, at Jidda; the other by an Arab passenger, who joined the ship at Makallah, to Dr. Hassan Effendi, the Egyptian sanitary agent at Jidda, in 1866. The master stated that two cases of cholera were observed on board on the third day after the ship put into Makallah. Dr. Hassan Effendi's informant stated that the disease manifested itself six or seven days after the departure from Makallah. These statements may not in reality be inconsistent with each other, as the cases referred to by the master may have happened while the ship was still in port, and before Dr. Hassan Effendi's informant went on board, while the cases to which the latter refers may have been the earliest of the subsequent development of the disease.

Probable presence of Cholera in Hadramaut early in 1865.

Dr. Hassan Effendi's informant, with about 70 pilgrims, all from Hadramaut, took passage for Jidda, by the "Persia," from Makallah. He joined the ship two days after his arrival at Makallah from the interior. The persons first attacked with cholera on board under his observation were, he said, passengers from Makallah; and he added that two months after his arrival at Jidda he had received a letter from his family in Hadramaut in which it was stated that cholera prevailed in their district, and had caused the death, among others, of one of his aunts.*

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* The following is Dr. Hassan Effendi's statement, read at the meeting of the Council of the General Sanitary Intendance of Egypt, 30th May 1866:—

"L'Intendance Sanitaire m'ayant confié le service sanitaire, je me suis appliqué à remonter à la source du choléra de l'an dernier. En faisant la visite réglementaire à bord du navire nommé *Tarsia* [*Persia*], provenant de Singapor, une occasion propice à mes recherches s'est présentée; car il m'avait été dit que ce navire

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The foregoing are the ascertained facts respecting the earliest known appearances of cholera on the Hadramaut coast and in the Red Sea in 1865. Another sailing ship from Singapore, the "Ruby," bound for Jidda, and carrying 500 pilgrims, was also attacked by cholera after touching at Makallah, and had 90 deaths from the disease on board. Other ships, moreover, carrying pilgrims from Bengal, *e.g.*, the "Meris Merchan" and the "Boy-Meyr," had fatal cases of cholera and diarrhœa on board. No account of these vessels has been furnished to the Department other than what appears in the proceedings of the International Sanitary Conference, 1866,* and this does not give the dates of sailing from the ports of departure nor the dates of arrival at Jidda, nor, except in the case of the "Ruby," the period of voyage at which fatal cases of cholera and diarrhœa occurred.

While the events just related were taking place on the north coast of the Gulf of Aden, events were happening on the south coast of the gulf a knowledge of which is necessary to a right interpretation of the former.

Cholera on East African coast and in Somali-Land at beginning of 1865.

In April 1865, at the commencement of the south-west monsoon, cholera made its appearance in the districts adjacent to the mouth of the river Jub. The disease subsequently extended down the coast as low as Mombassa, attacking severely Patta, Lamoo, and Melinda, when its progress

était précisément celui qui, l'an dernier, avait eu la maladie à bord. Je me disposais à procéder à un interrogatoire en règle, mais il ne se trouvait à bord ni le capitaine, lequel était marin en ce moment à Suez, ni aucun des marins qui avaient fait le voyage l'an dernier. Néanmoins mes recherches obtinrent du succes, car je découvrais un parent du propriétaire du navire (un nommé Ahmat Bascaraïl), et ce parent était le seul de ceux qui avaient fait le voyage avec le navire en question.

" Je me rendis donc auprès de la personne susindiquée, et la priais de me raconter les circonstances du voyage en question. Voici à peu près ce qu'elle m'a raconté :—

" Étant retourné l'an dernier de Kadramat [Hadramaut], et étant arrivé à Makalla, un des ports du golfe Persique, j'y trouvai le navire *Tarsia* [*Persia*], et je pris passage sur ce navire avec environ soixant-dix pélerins venant de Kadramat. Deux jours après mon arrivée à Makalla, c'est-à-dire le 18 Ramadan 1281 [12th February 1865], je me rendis à bord du navire où j'avais retenu ma place, et j'y trouvai environ quatre cents pélerins arrivés de Singapor, et le navire ainsi chargé parvint jusqu'a Gebel El Fuir, localité voisine d'Aden.

" Six ou sept jours après notre départ de Makalla une maladie se déclara à bord ; c'étaient des coliques, des crampes, de grandes froids aux extremités du corps, vomissements, diarrhées. Chaque jour cette maladie enlevait quatre ou cinq personnes, dont le décès avait lieu douze ou quatorze heures seulement après l'attaque. Nous eûmes, tout compte fait, environ cinquante décès en neuf jours. Lorsque nous arrivâmes à Djeddah, le 6 Chawal [6 Shawâl, 2nd March 1865], il y avait déjà trois jours qu'il n'y avait pas eu de décès a bord, et de Djeddah les passagers partirent de suite pour la Mecque.

" On doit croire, d'après les symptômes décrits ci-dessus que la maladie en question était le choléra. Je demandais ensuite dans quelle catégorie de pélerins la maladie avait debuté, et il me fut répondu que c'etait parmis ceux de Makalla. Deux mois après, continua la personne interrogée, je reçus une lettre de mes parents de Kadramat, dans laquelle lettre ils me racontaient que la maladie, *le vent jaune*,[1] faisait des ravages dans mon pays, et qu'elle avait même enlevé une de mes tantes." (*Procès-Verbaux des Séances du Conseil de L'Intendance Générale Sanitaire d'Egypte, présidé par M. le Dr. Colucci Bey depuis l'Apparation du Choléra en Egypte en* 1866, *jusqu'a sa cessation en* 1865. *Paris*, 1866, *p.* 145.)

* See *Rapport sur la Marche et la Mode de Propagation du Choléra.* (Annexé au Procès-Verbal, No. 23), p. 3. Also Fauvel, *Le Choléra, Etiologie et Propalaxié.* Paris 1868, p. 248.

[1 " Rih el Asfar ; properly meaning the yellow wind or air, or Cholera Morbus." Burton. *Personal Narrative of a Pilgrimage to El-Medinah and Mecca.* Vol. II., p. 174 and note.]

ORIGIN OF THE DIFFUSION OF 1865.

southwards is stated to have stopped contemporaneously with the stoppage of the southern coasting traffic on the setting in of the south-west monsoon. In Patta and Lamoo cholera prevailed until June, and in other infected localities on the coast it lingered until August. Dr. Christie, seeking for the origin of this diffusion along the African coast, ascertained from residents at Mukdisha (Magadoxa) that the disease had reached that town from the south, having previously been prevalent in Brava and Merka. The further investigation was worked out with the assistance of Mr. Brenner, one of the members of Baron Von der Decken's expedition, which, leaving Zanzibar in May 1865, when cholera was prevailing with great violence in the coast towns north of Mombassa, entered the River Jub in June, and proceeded along its course as high as Barderah. The expedition did not escape from the disease, several natives attached to it dying from cholera, and the Baron himself suffering a violent attack. On reaching Barderah, where shortly afterwards the Baron and the medical officer of the expedition were brutally murdered, it was found that cholera had been prevalent there a short time before, but had then ceased, and on inquiry from what source the malady had reached Barderah, information was received that it had previously prevailed at Gananah and Berbera. Cholera, in fact, according to this information, had first shown itself at Berbera, on the south coast of the Gulf of Aden, during the annual fair there, and had travelled southwards with returning traders along the ordinary caravan route to Gananah and Barderah. From Barderah the disease had passed to the mouth of the Jub and to Brava, and afterwards spread north and south along the coast.

The significance of the facts related in my previous report, from which I inferred the probable presence of cholera on the East African coast early in 1865, can now be understood. These facts were as follows :—On the 15th April 1865, Her Majesty's ship "Penguin," cruising off the east coast of Africa, captured near Mukdisha a dhow, running northwards with the south-west monsoon, and containing 127 slaves. While conveying the dhow to Aden, a considerable number of the slaves died from choleraic malady, which prevailed among them. One of the crew of the "Penguin" was attacked with a similar malady on the 17th April, and died after twenty hours illness. The same ship, it may be added, while cruising further north in the passage leading between Cape Guardafui and Socrata, captured another dhow, laden with 160 slaves, on the 16th May 1865. These slaves also suffered during the voyage to Aden, to which port the dhow was taken, from the same kind of choleraic malady as had been observed among the slaves in the dhow captured on the 15th April, and many died. On the 16th May, four days after the capture of the second dhow, another of the crew of the "Penguin" had a choleraic seizure, and died after eight hours' illness. Assistant-Surgeon George Maclean, reporting these occurrences at the time, observed, "In both cases the general symptoms were precisely similar to those of epidemic cholera."† There cannot well be a doubt, having regard to the knowledge now obtained of the existence of cholera in the Somali country and on the east coast of Africa north of Mombassa at the time of the captures, that the fatal affection among the slaves, and which carried off two of the crew of the "Penguin," was cholera. Cholera, it may be mentioned here, broke out in the town of Aden on the 22nd May 1865, and among the European troops stationed there on the 25th. The disease spread from the peninsula into the adjacent districts of Lahej and Foudeli.

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* *See* Mr. Maclean's account of the symptoms in the *Statistical Report on the Health of the Navy for* 1865, p. 240. I was indebted, in the first instance, to Deputy-Inspector General Dr. Mackay, the Medical Officer at the Admiralty, for a knowledge of the events related in the text concerning the "Penguin."

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Origin of the Diffusion of 1865.

Dr. Christie has satisfied himself that the history, given above, of the progress of cholera across the Somali country, from Berbera to the East Coast, early in 1865, is substantially accurate. The fair at Berbera, which is largely frequented by native traders from the interior and from Southern Arabia, and the coasts of the Persian Gulf and West Hindostan, begins in October or at the commencement of November, and ends late in April or early in March. In the interval the place is deserted. At the ordinary rate of travel pursued by native caravans, three months at least would be occupied in a journey from Berbera to the East Coast, by way of Gananah and Barderah. Hence Dr. Christie concludes that in order to account for the appearance of cholera on the East Coast, by extension along this route, at the period the disease was first heard of on the coast in April 1865, it must be assumed that an infected caravan left Berbera for Gananah and Bardera not later than December 1864. In other words, Dr. Christie believes, that cholera was present in Berbera before the close of that year, and most probably in the month of November; if, indeed, it were not introduced there and carried into the Ugahden district at the close of the fair of 1863–64.

No information appears to have been received by the Political Resident at Aden respecting Berbera during the fair-season of 1864–65; but in his official report for the period he refers to the fair as having been "broken up." I am unable to reconcile this statement with information as to the fair, derived from native sources on the East African Coast; and with Sir Bartle Frere's reference to the fair in the correspondence respecting his Mission to the East Coast of Africa in 1872–73.* In a despatch dated the 29th May 1873, he writes of the "annual commercial fair" at Berbera, and of its importance with regard to the subject of his Mission, and makes no allusion to any alteration in its character or to its decline as a native mart. He supplies, moreover, an explanation of the little knowledge possessed of Berbera, at the period under consideration, by the British representative at Aden, by referring to the "jealously-guarded system of non-intercourse" with the Somalis and their country, which was for many years "insisted on by the Indian authorities," and which has only latterly been relaxed.† It is noteworthy that the official report from Aden, which mentions the two dhows captured by the "Penguin," and brought into that port, makes no reference to the prevalence of choleraic disease among the slaves on board.

Before attempting to show the relationship existing between the different occurrences of cholera already recorded on the Hadramaut coast and in the Somali country early in 1865, it is necessary to state certain facts regarding other manifestations of the disease on the Arabian coast before the great outbreak at Mecca.

Probable cholera in Yemen in winter of 1864-5.

In the course of April 1865, cholera became prevalent in Hodeida, and it had appeared in several of the coast towns of the Hejaz, notably Confodah and Lith.

Assuming that the statement of Dr. Hassan Effendi's Hadramaut informant is substantially correct, it is to be inferred that cholera was prevailing in the interior of that province about the same time that it had become prevalent in Hodeida and elsewhere in Yemen.

It would appear, indeed, that cholera was actively prevalent in parts of Yemen, and probably also of Hadramaut, and that it was, moreover, prevalent in the Somali country and on certain parts of the East African coast in April 1865.

The question of origin of the different occurrences of cholera which have been described will perhaps best be considered, first, with reference

* Presented to Parliament, 1873. † See Correspondence, p. 145.

to the conclusion arrived at regarding the introduction of the disease into the Hejaz by the International Sanitary Conference of 1866.

ORIGIN OF THE DIFFUSION OF 1865.

THE STARTING POINT OF THE DIFFUSION.

Question of Importation from Singapore and Bengal.

The Conference held that there were two sources from which cholera had been imported into the Hejaz in 1865, namely Java and India; and in respect to India the particular source of infection indicated in its proceedings was Bengal. According to information furnished to the Conference by the Consul General of the Netherlands at Singapore, cholera had been very prevalent in Java and in Singapore in 1864, and instances were known of persons sick of cholera and convalescent from the disease having embarked that year on ships bound for the Hejaz. Instances have been cited in a previous paragraph of fatal cholera and diarrhœa occurring on board ships sailing from Bengal ports for the Hejaz. The Conference expressed no opinion on the probable existence or not of cholera at Makallah previous to the arrival of the ships "North Wind" and "Persia" there; but its definitive conclusion as to the source of infection of the Hejaz, necessarily includes the source of infection of the three ships which were attacked with cholera after touching at Makallah.

The usual length of voyage for sailing vessels engaged in carrying pilgrims from Singapore, the common port of embarkation for Javanese pilgrims, to Jidda, is 50 days, and, as proved in the instance of the "Persia," it may exceed 80 days. The usual length of voyage for sailing vessels from Calcutta (the port of embarkation from which the majority of the Bengal pilgrims come) to Jidda is from 60 to 75 days. Vessels from Singapore, as a rule, touch at Makallah, vessels from Calcutta at Aden or Hodeida. The Conference appears to have assumed that a case of cholera, occurring at a given date, may be referred directly, without the intervention of any other case, to cholera which had existed 50 to 80 days previously. I am not aware of any facts that justify such an assumption. There is no evidence forthcoming of the continued prevalence or of the occurrence of cholera in the interval of voyage, on board any of the ships arriving off the Arabian coast from Singapore and Bengal; and the fact of having sailed from an infected locality cannot be admitted as sufficient to support an assumption of practically an indefinite retention of the infection of cholera by the passengers or their goods.

If ships arriving from Singapore and from Bengal were the carriers of infection to the Hejaz, in 1865, the source of their infection should be sought, not in the original port of departure, but in some intermediate port at which they touched in their voyage. All sailing vessels from the Strait Settlements and from Bengal, bound for the Hejaz, probably touch at one of the ports on the Malabar coast for water and supplies. Both the "North Wind" and the "Persia" touched at Aleppy. The last-named ship, as already stated, was about 20 days in her passage from Aleppy to Makallah; the first-named, judging from her more rapid voyage between Singapore and Makallah, and Makallah and Jidda, would be a shorter time in passage. These vessels were at Aleppy at the period of commencing activity of one of the severest visitations of cholera from which Malabar and the western coast districts of Southern India has suffered.

It has not been practicable to push investigation of the question beyond this point, and probability of infection of the vessels when at Aleppy must be inferred from the events which occurred after they had touched at Makallah. The appearance of cholera on three Singapore vessels after having touched at Makallah suggests, in the first place, their reception of the infection in that port. It is certainly not inconsistent, in the cases of the "North Wind" and "Persia," with the assumption that the disease might have been contracted on the Malabar coast, although the coincidence of delayed development until after

Makallah had been reached would be remarkable. The information given by the masters of these vessels, immediately after their arrival at Jidda, to Mr. Henry H. Calvert, then Her Majesty's Acting Consul there, led him to the conclusion that cholera existed at Makallah when the two ships anchored in that port, and that they had been infected by the disease during their stay in it. This would appear to have been the belief of the masters at the time; but twelve months afterwards the master of the "Persia," when questioned on the subject by Mr. Raby, Mr. Calvert's successor in the consulate, stated that he had been informed at Makallah that no cholera existed there when his ship touched at the port in 1865. The statement made by Dr. Hassan Effendi's Hadramaut informant is consistent with the assumption either that the passengers from Makallah had contracted the disease before they went on board the "Persia," or, the disease previously existing in the ship, that they had received the infection after joining. If the former supposition be the most probable, assuming the freedom of Makallah from cholera at the time of arrival of the ships there, it would follow that pilgrims from the interior of Hadramaut, coming from the district in which, according to Dr. Hassan Effendi's informant, cholera had soon after his departure become prevalent, brought the disease with them into the town. On the other hand, assuming that one or both of the ships had imported the disease into Makallah, there may perhaps have been time, between the departure of Dr. Hassan Effendi's informant from his home and the manifestation of cholera there, for importation of the disease from Makallah. Or, indeed, both these assumptions may be in part true. In determining this question, or the greater probability of one or other assumption, the source of that prevalence of cholera which became manifest in the eastern Somali ports in April, and which is believed to have reached them from inland, becomes of great importance.

Neither the "North Wind" nor the "Persia" touched at any African port in the Gulf of Aden, or in the Red Sea between Makallah and Jidda. From the date of the "Persia" leaving Makallah (16th February) to the close of the north-east monsoon in March, communication by native craft could be maintained between that town and the east coast of Africa and the southern shore of the Gulf of Aden. Assuming cholera to have been present at Makallah, or in the vicinity, at the period in question, there were possibilities of its dissemination on both the eastern and northern coasts of the Somali country towards the end of February and the beginning of March.* Whether such chances of dissemination as are here indicated may have been concerned in the infection of the Somali country, will be best estimated after another, and, in this case, very probable, source of infection, now to be described, has been considered.

Epidemic cholera in Hindostan, 1863–1864.

Hitherto I have said nothing of a series of facts of which the different occurrences of cholera, that have been described in Arabia and East Africa, appear to me the continuation as well etiologically as chronologically.

In 1863 cholera became epidemic in the Lower Provinces, Bengal Presidency, and in the course of that and the two following years, it invaded the Central Provinces, the Bombay Presidency, the whole of Southern India, and Ceylon. The disease was epidemic in the Bombay Presidency in 1864–65, and in several districts it prevailed with unaccus-

* Dr. Christie doubts whether any dhow would venture to make any of the eastern Somali ports in February. He writes to me, of these ports, that "they are open roadsteads, and even in calm weather, tremendous seas roll in on the coast. A vessel becalmed near the coast, would be in the greatest possible danger. Dhows run regularly fer Zanzibar at the close of the north-east monsoon, but they do not usually call at intermediate ports."

tomed violence. In the island of Bombay the mortality from cholera this year had only once been exceeded, (namely, in 1850, "the great cholera year,"*) since a registration of deaths had been established in the island in 1849. The mortality from the disease in the island in 1864 was 4,588, an excess of 2,581 above the average of the preceding 10 years. In 1850 the mortality had been 4,729.

The number of deaths from cholera registered in the island of Bombay in the months of November and December 1863 had been 176 and 319 respectively. In January 1864 the number increased to 622, this great augmentation being followed by a decrease in each of the two succeeding months, the mortality again rising to 680 in April, and reaching a maximum of 837 in May. After this month there was a steady decrease of the deaths from cholera until October, in which month only 88 were recorded. In November the mortality from the disease again increased; in December 431 deaths were recorded; and in January 1865, 363.

Coincidently with, or following in quick succession upon, the recurring activity of the disease here noted in Bombay, cholera commenced spreading actively in the Western Coast districts, notably in Malabar. "So "early as February and March (1864) cholera began to move southward "through Mysore, and from the southern districts of Bombay territory "into the Bellary District, which had escaped. But the most marked "manifestation of cholera occurred in the Western Coast Districts, par-"ticularly in Malabar, where 40,000 of the inhabitants died. Cholera "began to be active all through the cold dry months of the beginning of "the year, and attained its greatest activity in June and July."† The distribution of cholera in the Bombay Presidency during 1865 is pretty accurately known,‡ this being the first year in which a registration of

* *Deaths in Bombay during* 1864, p. v. The year of the registration returns dates from the 1st February.

† *A Record of the Progress of Cholera*, 1870, *and Resumé of the Records of former Epidemic Invasions of the Madras Presidency*. By Surgeon-Major W. R. Cornish, F.R.C.S., Sanitary Commissioner for Madras. Madras, 1871, p. 23. Consult also as to Cholera in India, during 1863–64, Mr. C. Macnamara's *Treatise on Asiatic Cholera* (1870).

‡ Deaths from Cholera in the Bombay Presidency, 1865.*

Divisions.	Population.	Deaths from Cholera.	Months of Greatest Prevalence.
Tana - -	900,000	7,963	May and June.
Surat - -	792,638	9,463	Do.
Kaira - -	586,606	5,800	May, June, and July.
Khandesh - -	822,476	14,598	Registration began on June 1, when they were 6,137.
Ahmednuggur -	1,252,789	15,609	April, May, June.
Poona - -	679,429	9,114	Do.
Sholapur - -	634,867	3,493	April, May, June, July.
Satara - -	858,022	6,878	April, May, and June.
Kaladgi - -	563,123	3,055	April, May, June, and July.
Belgaum - -	707,537	1,247	May, June, and July.
Dharwar - -	782,465	1,191	June and July.
N. Canara - -	394,040	327	No special period of prevalence.
Ratnagiri - -	685,372	2,250	May, June, and July.
Scinde { Karachi -	340,000	300	Registration began in August, when deaths 101.
Scinde { Hyderabad	630,300	1,850	Do. in July, when deaths 1,313.
Scinde { Shikarpur	650,304	37	Do. deaths July 23 and Aug. 14.
Upper Scinde -	47,955	—	——
Thur and Parkur -	127,035	—	——

* Report of Sanitary Commission for Bombay, 1865.

deaths among the civil population was attempted to be carried out in the greater number of the districts. The disease was generally epidemic throughout the central and southern divisions of the Presidency. Judging from the death registers it was active in the coast district of Tana at the beginning of the year, and in the adjacent coast district to the north, Surat, it became active in February. The following month, March, it began to spread in the districts of Ahmednuggur and Poona, contiguous to Tana, inland; also, in the district of Sholapur. The epidemic activity of the disease became manifest in the districts of Satara and Kaladji, in April; in the districts of Belgaum and Ratnagiri, in May; and in the district of Dharwar in June. In other districts registration was not commenced until the disease was in full activity or on the decline. This was the case in the Hyderabad and Karachi divisions of Scinde. From Karachi cholera is stated to have passed into Beluchistan and thence into southern Persia, extending along the coasts of Mekran, Mogistan, and Laristan, and the north shore of the Persian Gulf as high as Alsaloo (Bander es Salih), reaching that point in September.*

The appearance of cholera in an active form and its subsequent extension in Hadramaut, in Yemen, and in the Somali country, contemporaneously with wide prevalence and active extension of the disease in the Bombay Presidency, and following in succession upon a westward movement of cholera which, beginning in the Lower Provinces, Bengal, in 1863, had extended in an epidemic form to the Bombay Presidency in 1864, suggests that the phenomena form a continuous and connected series. That such was the case and that the relationship, in the first instance, between the outbreaks in Arabia and in East Africa and the prevalence of cholera in the Bombay Presidency, was of the same sort as between the subsequent outbreaks in Egypt and the Hejaz, and between Europe and Egypt, I have no doubt. North of the Straits of Bab-el-Mandeb the carriage of the disease in the ordinary

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* Mr. W. H. Colvill, then Civil Surgeon at the Bushire Residency, under instructions from the Political Resident in the Persian Gulf, Lieut.-Colonel (now Colonel Sir) Lewis Pelly, made, towards the close of 1865, an inquiry regarding the progress of cholera, during the year, in the countries bordering on the Persian Gulf. For the purpose of this inquiry, so far as it related to the Persian coast, he travelled by land from Bushire to Bassidore. In a despatch from Bassidore, dated 19th January 1866, he thus describes the results of this part of his inquiry: "Advancing "from India along the Meckran coast [cholera] was reported, in the end of last "May, to have reached Meenao, a highly cultivated district, with a village of about "2,000 inhabitants, situated on the Persian side of the Gulf, 60 miles eastward from "Bunder Abbas. In that month the heat at Bunder Abbas was intense, and on the "first report of cholera most of the inhabitants fled to Meenao. For that reason, "perhaps, the epidemic visited that town [Bunder Abbas] but slightly. From "Bunder Abbas, cholera proceeded inwards towards Shiraz, and onwards along the "Persian coast. Proceeding inland in the direction of Shiraz, it visited, but not "severely, the villages Jaharan, Fasa, and Darab, where it ceased. In no instance "has it appeared on the tableland of Persia. Proceeding onwards along the coast "and northern shore of the island of Kishm, it reached Lingah in August, and "remained there 75 days. Taking the average of numerous statements, it would "appear to have carried off about 10 per cent. of the inhabitants. For three consecutive days 40 people it is said died daily. Immediately to the north-west of "Lingah is a district called Bunder Kunderoon, containing numerous villages, "lying round a salt marsh. In this district there are about 3,000 families, and 200 "people died of cholera. Charrack, with 300 families, did not lose more than "10 people, and from this the epidemic confined itself to the villages immediately "on the shore. At Cheroo it remained 45 days, and out of 400 people 40 died. "Nachilo, a village of 60 families, lost from 15 to 20 persons. The town of Nabend "escaped, but Assaloo, containing 400 people, lost two men and five women. And "here cholera ended on the Persian coast. In all these villages the nearest approach to time that can be given is that the epidemic appeared during the cutting "of the dates."

course of traffic or of pilgrimage was the observed initial fact of diffusion; south of the Straits it is to be assumed that the same rule of dissemination held good. The epidemic which began in the Lower Provinces, Bengal, 1863, and spread very generally in the Bombay Presidency in 1864, has been described as extending during that year, especially in Western and South-Western Hindostan. Northwards it reached as high as Scinde; southwards, overpassing the boundary of the Bombay Presidency, it passed as low as the extreme limit of the peninsula, in Travancore, and invaded Ceylon. This extension, on the north, as already stated, continued the subsequent year, and passing beyond Scinde extended to the coast of Mekran, and along the north side of the Gulf of Oman and of the Persian Gulf. The coast-line of the great tract of country thus infected overlaps, so to speak, the southern coast of Arabia, and the coasts of the Somali country; and between the different coasts a considerable native traffic is maintained. This traffic, except on the Indian coast, and then only in a few large ports, escapes close observation, but its agency in the interchange of infectious diseases, as well as of materials of native commerce is well understood. It is highly probable that the coasting traffic played the most considerable part in the dissemination of cholera along the West Hindostan and Beluchistan and Persian coasts in 1864–65. Outbreaks at Cochin in February and September of the former year were in each case preceded by the arrival of ships with infected crews from northern ports. The two infected slave dhows captured by the "Penguin" when running north from the East African coast for the Arabian coast, illustrate the important part which this traffic may play in the interchange of infectious diseases on the coasts where it occurs. Facts of transmission from the Indian coast to the Arabian and Somali coasts, must necessarily, from the nature of the native traffic, and from our little knowledge of the ports to which it is directed be unattainable; but it is known that the Arabian, the Persian, and the East African ports import into Bombay small-pox, and it is to be inferred that any infection current in Bombay may as certainly be exported to the ports of the several coasts named. Indeed, such exportation appears to extend to ports in the Red Sea as high as Jidda, for Mr. Stanley, who was Her Majesty's Consul there for five years, and Mr. Henry H. Calvert, who held the same post at the time of the appearance of the cholera in the Hejaz in 1865,* both have stated that cholera is imported into that town from India on the recurrence of every pilgrimage.

It is in the highest degree improbable that the movement of cholera westward from the Lower Provinces, Bengal, through Central India, into the Bombay Presidency would be arrested at the coast. The great dispersion along the coast line, north and south, implies a like extensive movement seawards, facilities existing for the propagation of the disease in that direction. Such facilities are mainly afforded by the native craft trading to Arabia and East Africa, but with them they occur only at one period of the year, namely, at the time of the north-eastern monsoon. These craft make one voyage out and home annually for the northern ports and Berbera, and leave the Indian coast, as a rule, with the earliest setting in of the monsoon. Few native craft would delay, till the close of the monsoon, sailing westwards to these places from Bombay, and other ports in the Bombay Presidency, which might have begun to suffer from the commencing epidemic of 1863. It is quite possible, however, that cholera may have been introduced into Berbera and carried inland at the termination of the fair

* Mr. Calvert was Acting Consul at Jidda from November 1st, 1864, to July 8th, 1865.

ORIGIN OF THE DIFFUSION OF 1865.

of 1863–64. But the opening of the monsoon, in 1864, coincided with the reawakening activity of the disease and its wider prevalence on the coast and in the Presidency. In view of the active diffusiveness cholera was then manifesting, the transmission of the disease seawards by native craft at that time, and its importation into Arabia and East Africa, notably at Berbera, becomes almost as certain as if all the details of the process had been witnessed step by step. Indeed, there is not wanting some evidence of such importation into Arabia. Mr. Raby, when, in 1866, making inquiries for the International Sanitary Conference concerning the outbreak of cholera in the Hejaz in 1865, received information, the accuracy of which he was unable to determine, of the existence of the disease in Sana and other places in Yemen towards the close of 1864. Moreover, Dr. Dickson, the physician to Her Majesty's Embassy, Constantinople, submitted to the Conference information derived from letters from the Governor of Yemen in 1865 (Ahmed Pasha), addressed to his family, which he believed established the presence of cholera in that province before the epoch of the pilgrimage. This conclusion, Dr. Dickson informs me, was afterwards confirmed by testimony derived from native sources.*

Conclusions as to source of diffusion.

Reviewing the different facts and considerations which have been advanced, they appear to me to lead to the following conclusions :—

1. The infection of Mecca and the Hedjaz with cholera in 1865 was part of a wider infection, including Yemen and Hadramaut, in Southern Arabia, and the Somali country, in East Africa.

2. The infection of Yemen, Hadramaut, and the Somali country preceded the infection of the Hejaz.

3. This infection was a continuation of the epidemic movement of cholera westwards which, beginning in the Lower Provinces, Bengal, in 1863, had extended the same year through the Central Provinces into the Bombay Presidency, and spread along the whole western seaboard of Hindostan in 1864 and the beginning of 1865.

4. Although the details of transmission necessarily escape observation, it is to be inferred that the infection was carried seawards during the north-east monsoon, in the ordinary course of native traffic, and towards the close of 1864 (if not at an earlier period of the diffusion) was imported into Yemen, Hadramaut, and the northern Somali country.

5. This view, in accordance with the reported presence of cholera in Yemen near the end of 1864, and its probable presence in Hadramaut early next year, most satisfactorily explains, so far as the facts are known, the concurrent infection of both the Arabian and the African coasts of the Gulf of Aden.

6. The part played by the "North Wind" and the "Persia," whether these ships contracted the disease at Aleppy or at Makallah, was but a prominent early incident in the transmission of cholera from Hadramaut on the one hand, or from the west coast of India on the other, into the Hejaz.

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* I have the gratification of stating that Captain Richard F. Burton, who has lately proceeded on a mission to Sana, has most willingly and kindly undertaken to obtain such information as may now be practicable concerning the presence of cholera in that city, and in Yemen generally and Hadramaut, at the period under consideration. He will also endeavour to procure direct information respecting cholera at Berbera during the fair of 1864–65. This is the first opportunity of which I have been able to avail myself since 1865, of getting information respecting cholera in Yemen on the spot, Captain Burton has at all times taken an interest in inquiries of this kind, as is amply shown in his various works of travel; and his rare power of observation and command of languages may probably enable him to set definitively at rest the questions relating to the mode and time of introduction into Southern Arabia of the epidemic of cholera which forms the subject of this report.

7. The early manifestations of cholera in the ports of Yemen on the Red Sea in 1865, preceding the appearance of the disease in the Hejaz, probably arose in part from groups of infected pilgrims landing there, on their way to Mecca, from the Berbera fair.

8. Mecca and the Hejaz, indeed, were exposed to infection, and were most probably infected from the several sources following; namely, (*a*) from the transmission by land routes from Yemen, and by sea from the ports of Hadramaut, of cholera imported into those provinces in 1864 or early in 1865; (*b*) from the northern Somali country by traders returning from the Berbera fair and the pilgrims accompanying them in March and at the beginning of April; and (*c*) from Western India direct by way of Jidda.

9. So far as the infection of the Arabian coast is effected by native trading craft it almost wholly escapes observation, and even at Jidda it hardly admits of regulation. Any recommendation designed to limit the introduction of cholera into the Red Sea ports which fails to provide for the supervision of native trading craft must necessarily be fallacious.

10. The recommendation of the International Sanitary Conference of 1866, that a sanitary (quarantine) station should be established at the mouth of the Red Sea, was founded on the belief that the principal danger to the Hejaz from infection of cholera was the direct importation of the disease from India and the Eastern Archipelago, a belief not supported by the more complete knowledge which now exists of the conditions under which the infection of the Hejaz in 1865 took place. A sanitary (quarantine) station at the mouth of the Red Sea, would enable some sort of supervision to be maintained over pilgrim-carrying ships; but there is no sufficient probability that the good it might effect would be at all commensurate with the difficulties attending its establishment, maintenance, and working. Indeed, as a sanitary station, it is little likely that such a system of medical inspection over the pilgrims and separation of the sick could be carried into operation as would be at all worthy of confidence, and as a quarantine station there is no good reason to believe that quarantine would be more efficacious here than it has been elsewhere where its restrictions being applied to one source of danger, other sources not less perilous have been left unfettered.

II.—The Outbreak at Mecca in 1865.

Pilgrimages in relation to the Diffusion of Cholera.

The outbreak of cholera at Mecca in 1865 was one of several outbreaks having certain characters in common, which had happened in the progress of the epidemic westward from India. At Mecca, indeed, existed on a gigantic scale, when cholera broke out there with greatest intensity, conditions especially favourable to the active maintenance and subsequent diffusion of the disease, but which, with one exception, were not peculiar either to the locality or to the pilgrimage. If the particular foulness of the period of sacrifices be excepted, there were no states of filthiness, over-crowding, fatigue, or ill-feeding which could not then be paralleled by like states during the great Hindoo pilgrimages, and of which the filthiness and overcrowding, at least, were not also common to those great Eastern fairs which are not religious festivals. Competent observers have advanced reasons for the belief that cholera would rarely occur in a pestilential form in many districts of India, and perhaps die out in some, if it were not that the disease, when it becomes epidemically diffusive, is in effect cultivated by the annually recurring religious festivals.

The earliest information I have met with relating to the epidemic extension of cholera in 1863–64 in the Bombay Presidency refers to

the religious festivals or fairs of Punderpoor and Alandi. Two fairs are held yearly in each of these places, one in July and one in November. Punderpoor is a town, in the Satara collectorate, situated on the river Bheema, 31 miles from the Barsi Road station of the Great India Peninsula Railway, which has become "the main feeder of the pilgrimage."* It had in 1851 a permanent population of 14,000, living in 2,100 houses. Alandi is a small village, in the Poona collectorate, situated on the River Indrayani, 13 miles north of Poona. It has a permanent population under 2,000 in number, living in 200 houses. The pilgrims who resort to each of the annual fairs at Punderpoor are estimated to average in number 50,000; at Alandi upwards of 20,000. At certain of the Punderpoor fairs the number of pilgrims has exceeded 100,000, and is believed to have been not less than 125,000. Notwithstanding the long-continued efforts of the Bombay Government, dating from a period before that now under consideration, to ameliorate the condition of the pilgrims congregated at the fairs as to filth and over-crowding, and generally to subject the rites and the unwholesome states incident to them to sanitary regulation, the fairs are still a constant source of anxiety from their liability to become centres for the development and diffusion of infectious diseases. Many of the pilgrims who visit Punderpoor commonly visit Alandi also, so that the one fair at times is apt to intensify epidemic mischief started in the other. This appears to have been the case in November and December 1863, when, according to one observer, although cholera had shown itself in an aggravated form at Punderpoor, it was at Alandi, after the arrival there of pilgrims from Punderpoor, that the disease first showed that epidemic diffusiveness which in the two following years characterised its course in the Presidency.† Dr. Haines, the superintendent of mortuary returns for Bombay, in his report for 1863, after indicating the Deccan as the probable source of previous infections of Bombay with cholera, observes: "But that the great outbreak in December last [1863] "was due to contagion imported thence there can be no reasonable "doubt. For days before the disease broke out here it was notorious "that the pilgrims returning from the fairs of Punderpoor and Alundee "[Alandi] were dying by hundreds, and the introduction by them of "the disease into the city of Poona was greatly dreaded, and not "without reason. It soon appeared there, carrying off scores daily, and "very shortly afterwards the rapid increase of cholera in that town "showed how quickly the contagion spread along the ordinary line of "traffic."‡

The re-commencing activity of the epidemic in the Bombay Presidency in 1864 appears to have been first especially noted in the

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* See on Punderpoor (Pandharpur) and Alandi, and the religious festivals there, *The 10th Annual Report of the Sanitary Commissioner for the Government of Bombay* (1873), *Section V.*

† The Rev. Adam White, who visited the festival at Punderpoor in November 1863, and who lost his life from cholera at a subsequent period of the epidemic, wrote in January 1864 as follows:—

"The day after I left Punderpoor, cholera in a bad form manifested itself among the pilgrims, but many did not die. The disease might have died out if it had not been cultivated. But the same pilgrims immediately resorted, as is their wont, to Alandi near Poona, and there it met with a favourite field in which to grow. The seed sown at Punderpoor ripened quickly and fearfully at Alandi, and the grain was thus scattered broadcast over the length and breadth of the land by pilgrims on their way home. Poona was one of the first places to suffer, and a vast number died in it. The moment the returning pilgrims reached any field of labour [sassoor], the disease appeared and people began to die. . . . . Every village almost had its tales to tell."—*Deaths in Bombay*, 1863, p. xiv.

‡ *Deaths in Bombay*, 1863, p. xi.

THE OUTBREAK AT MECCA, 1865.

Khandesh collectorate at Mahiji (Mhyjee). This small town, situated on the Great Indian Peninsula Railway, about 30 miles east of Dhoolia, is the seat of the largest of the fairs in the Presidency, devoted entirely to internal trade. Here, in February, after the commencement of the fair, cholera broke out violently, and the disease is described as having "raged severely," while the fair continued, during that and the subsequent month. Again, in 1865, an important part has been assigned to pilgrimages in determining early epidemic activity of cholera in that year.* In these instances, as in the outbreaks on board the pilgrim-carrying ships off the coast of Hadramaut, the epidemic manifestation of the disease may be said to have been precipitated, as it were, by the conditions under which the outbreaks occurred.

It would have been instructive, had it been possible, to have followed in some detail the history of the westward propagation of cholera during 1863–65, to the time of the outbreak at Mecca, in relation to religious and commercial fairs. But at this period there was no connected account of the movements of cholera among the civil population of the three Presidencies of Hindostan, and only such scattered information on the subject as that of which I have given a sample appears to be obtainable. This, however, is sufficient to indicate that events of development and diffusion, such as I am about to describe of the outbreak of cholera at Mecca, are common to all these gatherings at periods when cholera becomes diffusive, as are the conditions which determine them. Our knowledge is still very inadequate of the influence which the great religious gatherings at Nedjef (Meshed Ali), at Kerbella (Meshed Hussein), at Meshed and other centres of pilgrimage in Irak Arabi and Persia, may have exercised in favouring the transmission of cholera to Europe in the different invasions to which the Continent has been subjected. Meshed lies on the great northern trade route from India to Persia and the south shore of the Caspian; Nedjef and Kerbella on the route by way of the Persian Gulf and Irak Arabi. There are some grounds for the belief that the pilgrimages to these places may have exercised a hardly less important influence upon the propagation of cholera to Europe in previous invasions than was exercised by the pilgrimage to Mecca in 1865. I shall have to show presently these widely separated places re-acting on each other in the propagation of cholera, and forming during times of pilgrimage centres in which the disease may take on fresh activity.

Outbreak at Mecca in 1865.

At what date cholera first appeared in Mecca, in 1865, is not known.† Rumours of an unusual mortality among the pilgrims had reached Egypt

* The following, with reference to 1865, is from Dr. Bryden's work, *Cholera Epidemics of Recent Years* (1874, p. 121):—"Colonel Keatinge writes to me from "Kattywar in June 1865: 'There is much cholera in the south-east of the pro- "'vince. There was a fearful outbreak at the close of a great concourse of pilgrims "'at the Palectana Hill in the cold weather, and it has lingered ever since. Our "'invalids and time-expired men from the Punjab who went down the Indus met "'this cholera as soon as they arrived at Kurrachee in the early months of 1865.' ". . . . . In the introduction to the 'Deaths of Madras,' for 1864, it is "'mentioned that in these months of 1865 the high road leading from Nagpore "'to the terminus of the Bombay railway had been literally a valley of death." The following extract is from this report: "During the past year (1864) and the "present (1865), two fearful epidemics have taken their origin from the same "spot (the Temple of Mahadeo)."

† Mr. C. Macnamara writes as follows upon this subject:—"My friend, Saeed "Bukht, of Sylhet, who has lately been in Calcutta, but who was a member of the "local council of Mecca in 1865, assures me that cholera did not exist in or about "the city before the end of March 1865. On the 24th and 25th of that month he

THE OUTBREAK AT MECCA, 1865.

in March, and in April the Egyptian Board of Health sent a medical commission, consisting of two Mahommedan physicians, to the Hejaz, to ascertain the actual state of things there. This commission reached Mecca just before the commencement of the rites of pilgrimage, and, according to a report dated the 10th May 1865, they found cholera prevalent among the inhabitants of the city, the soldiery, and the pilgrims. Many dead were seen lying in the mosques, and some in the streets. The disease was most prevalent and fatal among the pilgrims the third day of the rites, during the assemblage on Mount Arafat, the 2nd May. The deaths in Mecca the same day were estimated at 200. An Ottoman sanitary commission, sent to the Hejaz to investigate the outbreak, reported several months afterwards that the disease "broke out" in the valley of Muna during the second day of the sacrifices (4th May), referring probably to the period of assumed greatest prevalence of the disease. According to this commission the number of pilgrims assembled at Mecca was 100,000, and the mortality from cholera among them was from 10,000 to 15,000. The International Sanitary Conference of 1866, from the information in its possession, came to the conclusion that more probably the mortality was double that amount, the number of pilgrims, according to Mr. Henry H. Calvert, not exceeeding 90,000.

There is no reason to believe that the conditions under which the rites of pilgrimage were performed in Mecca in 1865, differed in any material degree from the conditions described by Burton in 1853*, and by Burckhardt† at an earlier date. It was not until after the outbreak of cholera there in 1865, and as one of the consequences which followed from it, that the Ottoman Government instituted systematic measures for the sanitary regulation of the pilgrims during the performance of the rites. In 1865, it is to be inferred that, as in previous pilgrimages, there were congregated at Mecca, while the different observances of the pilgrimage were being accomplished, a large proportion of the way-worn, the exhausted, and the starving; and that from the greater number of pilgrims assembled that year the over-crowding of the city and the encampments would be greater, as also, if this were possible, their indescribable foulness, a foulness from the stench of which even the

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" states that rain fell over Mecca, and about the same time cholera broke out among " the assembled pilgrims. Few men are better acquainted with the phenomena of " the disease than Saeed Bukht; being a native of Lower Bengal he had seen cases " of it year after year from his infancy, and is, moreover, a remarkably shrewd and " keen observer. He is well aware of the history of the ships 'Persia' and 'North " Wind,' in connexion with the outbreak of the disease at Mecca, and his remark " on the subject to me was, that very likely cholera was introduced by the infected " pilgrims arriving in these vessels. But who can say when there were so many " thousands of men coming and going?" The completion of the paragraph from which the above is quoted is of much interest, showing that Mr. Macnamara, working independently in India at the question of origin of the diffusion of cholera, considered in this report, arrived substantially at the same conclusion as myself working in this country. He continues: "Moreover I have already shown that the disease had " spread from Bengal into Central India and Bombay in 1864, and had been " reproduced over the whole of that territory with extreme virulence in 1865; and " further, that early in the year it was known to be prevalent along the sea coasts " of Arabia and the western shores of the Red Sea, having, doubtless, extended " from the various ports in the Bombay Presidency, as it had done on every pre- " vious occasion when it visited Arabia and the shores of the Red Sea, notably " as described by Ruttonjee Hormusjee in 1858."—*A Treatise on Asiatic Cholera*, by C. Macnamara, 1870, pp. 203–4.

* *Personal Narrative of a Pilgrimage to El Medinah and Mecca*, by R. F. Burton, 3 vols., 1855–6.

† *Travels in Arabia*, by J. Lewis Burckhardt, 2 vols., 1829.

almost stench-proof Arab of Mecca seeks protection by plugging his nostrils with cotton.

No detailed account has been published by any eye-witness of the events which happened at Mecca and in the several localities where the rites are performed during the days devoted to them. It is simply known that the great mortality from cholera happened in the course of the six days over which the rites extend, while the pilgrims were at Arafat, and in the valley of Muna. Probably two-thirds of the whole number of deaths took place in this brief space of time. The streets of Mecca, its mosques, the twelve miles of road lying between the city and Mount Arafat, the valley of Muna, and the plain of Arafat were cumbered with the dead. At all times the exhausted pilgrim is apt easily to yield up life. To a fatal infection like cholera he succumbs unresistingly. Death on the sacred soil is to him but the passage to beatitude.

The Diffusion from Mecca Northwards & Westwards.

The last day of the rites in 1865 was on the 6th May, and the pilgrims, panic-stricken by the ghastly mortality, hastened to leave Mecca. When my first report was written, the events which had occurred on the homeward route of the pilgrims who journeyed to Egypt by way of Jidda and the Red Sea, and onwards from Egypt by way of the Mediterranean, were alone known and these not fully. The events which occurred among the bodies of pilgrims travelling homewards on the northern and eastern pilgrim land-routes, have since been ascertained to some extent; but of the events occurring among the pilgrims travelling by the southern pilgrim routes nothing is known. On all the routes of which we have knowledge of what happened on the passage of the returning pilgrims cholera was carried in their train. It was thus carried along the northern sea-route to Egypt and Nubia; along the northern land-routes into the desert to some of the desert towns; and along the eastern land-route through Central into Western Arabia. I proceed to describe the order of appearance of the disease on the several routes, and the succession of events which followed thereupon.

1. *The Diffusion along the Northern and Western Pilgrim Sea-Routes.*

The Diffusion to Lower Egypt.

The rites ended, in 1865, on the 6th May, and four days afterwards pilgrims returning from Mecca began to enter Jidda. There had been considerable mortality among them from cholera on the journey. The pilgrims bound seawards hastened to embark for their several destinations, and on the 19th May the first ship bringing pilgrims from Jidda arrived at Suez. About the same time, it is to be inferred from subsequent events, vessels with returning pilgrims bound for Kosseir and Suakin arrived in those ports.

The appearance in Suez, May 1865.

The ship which reached Suez from Jidda on the 19th May, was an English steam vessel, crowded with 1,500 pilgrims. At this time no suspicion existed in Egypt of any peculiar tendency among the population to diarrhœal disease, or of the existence of any choleraic malady other than might be of ordinary occurrence in the country at all times. Several days before the arrival of the ship in question, and before definite information had been received of the existence of cholera in Mecca, the Sanitary Administration had determined to adopt certain precautionary measures* with a view of preventing the introduction of

* Meeting of the 3rd May 1865.

disease into the country, by the returning pilgrims. Arrangements were made for a medical inspection of the different bodies of pilgrims as they arrived, for subjecting such of these bodies as might be found infected to quarantine, and for limiting to the shortest period the sojourn in Lower Egypt of pilgrims who were traversing the country to other destinations, preventing at the same time as far as practicable their intercourse with the population. To effect the latter objects, provision was made for sending these pilgrims on their arrival at Suez by express trains to Alexandria, and for embarking them there at once upon steam boats for their further destination. The first ship which orrived at Suez with pilgrims, as each of the subsequent ships, was inspected medically, but not a single instance of cholera or of sickness was observed on board, and no ship was in consequence detained in quarantine. So rapidly did these vessels succeed each other, that before the close of May from 12,000 to 15,000 pilgrims had been landed at Suez, and a considerable proportion of these had, immediately after landing, been sent by rail to Alexandria. The total number of pilgrims landed at Suez, returning from Mecca, was 18,490*. Among this great number of pilgrims the medical inspectors of the Sanitary Board failed to detect any signs of choleraic disease before they left ship-board ; and of the pilgrims who afterwards encamped outside Alexandria waiting embarkation for other ports, indications of much fatigue were alone noted. It is not easy to conceive what sort of medical inspection is possible of masses of such men as these pilgrims are, made on the crowded deck of a ship or in a hardly less crowded encampment, under the condition that the delay necessary for proper observation shall only be interposed if the disease for which the observation is made shall be there and then found. It is obvious that an inspection of this kind can only apply to very marked appearances of disease, and that it is altogether illusive, as proved to be the case here, as regards appearances less manifest, but not less dangerous to the safety of a community.

After the pilgrims landed at Suez those who dwelt in Lower Egypt proceeded at once to their several destinations, many travelling by rail, and, as customary, the people of the places through which they passed, and at the railway stations where they alighted, crowded to salute the happy men fresh from the sacred soil of Mecca. Whatever precautions may have been taken to limit, during the journey, intercourse with such of the pilgrims as were hurried by express trains to Alexandria in order to be embarked for other parts, no restriction appears to have been placed upon communications between them and the inhabitants of the city, while they remained encamped in the vicinity.

Events quickly proved that cholera had not so completely died out among the pilgrims after leaving the Hejaz ports as had been assumed from the cursory inspections at Suez and Alexandria. It is highly probable that the disease was so nearly upon the point of extinction, that a few days longer voyage in the Red Sea, or a brief period of detention under observation, might have brought about its cessation, had not the infection been introduced among a population of which the susceptibility to cholera was fresh. But that the infection existed among the pilgrims, and was introduced in their train into Egypt, is proved by the following facts.

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* From Jidda - - - 10,125
From Yembo - - - 8,339
From Suakin - - - 26

18,490

The first ship carrying pilgrims returning from Mecca arrived at Suez, as already stated, on the 19th May 1865. During the voyage there had been six deaths among the pilgrims, from unascertained causes, and the bodies had been thrown overboard. On the 21st May, the second day after the ship's arrival, the captain and his wife were both attacked with cholera. The cases were observed by Dr. Papathodor, a medical man in the service of the Isthmus of Suez Canal Company, but neither case appears to have been fatal. On the 22nd May, Dr. Fibich, another medical man in the service of the same company, saw a case of cholera at Damanhur, 46 miles E.S.E. of Alexandria, and on the line of railway from Suez, among a body of pilgrims coming from the last-mentioned port.

The appearance in Alexandria, June 1865,

On the 2nd June a case of cholera (the first recognised) occurred among the inhabitants of Alexandria who were in communication with the pilgrims. On the 5th June two other cases occurred under the same circumstances. From this date cases became more numerous, but until the 12th June, according to Dr. Aubert Roche, Principal Medical Officer of the Suez Canal Company, they were confined to that portion of the population which was brought into contact with the pilgrims.*

On the 11th June the presence of cholera in Egypt first became known to the Sanitary Administration, and the next day (the 12th) four deaths from the disease were officially reported in Alexandria. The patients among whom these deaths occurred were porters and labourers attached to the railway, who, from the nature of their duties, and the position of their homes, were necessarily in close communication with the pilgrims. The same day foul bills of health began to be issued to ships leaving the port. On the 13th June, 12 deaths from cholera were reported ; and on the 14th, 39.

and in Cairo,

On the 16th June, six cases of cholera were reported at Cairo, five of the patients being persons (it is not stated whether they were pilgrims) coming from Suez, who were taken ill at the railway station; the sixth was an individual living in the Lesbekieh quarter.

and Kosseir,

The same day a ship from Jidda arrived at Kosseir, carrying 73 pilgrims, four of whom were ill of diarrhœa, and two deaths (cause not ascertained) were reported at sea. No information is given of previous arrivals of ships from the Hejaz in this port, and official records simply mention that cholera began here "early in June."

and Suakin.

About this time it is to be inferred that cholera was present in Suakin, as on the 24th June the Egyptian frigate "Ibrahimée" arrived at Suez from that port with 12 of her crew sick of cholera.

Kosseir and Suakin were probably infected about the same time as Lower Egypt.

The subsequent diffusion of cholera in Egypt and Nubia, and the further spread of the disease in East Africa will be treated in another section.

There is no clear evidence of the carriage of infection by the pilgrims embarking at Alexandria to other points in the basin of the Mediterranean. Where, on the one hand, the lines of transmission coincided with the passage of pilgrims, as at Malta, Marseille, and Beyrout, they

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* The authority for these statements is Dr. Aubert Roche, the Principal Medical Officer of the Isthmus of Suez Canal Company at the time. See his *Rapport sur le Choléra dans l'Isthme de Suex en Juin et Juillet* 1865, p. 12.

coincided also with the passage of numerous persons, many of them fugitives, from the freshly infected population of Alexandria. Moreover, in no instance along those lines of transmission is it reported that the first imported or occurring case was a pilgrim. On the other hand, no infection, as far as is known, followed in the train of the pilgrims who landed in Tripoli, Algeria, and Morocco; but there were several instances of infection accompanying ordinary passengers from Alexandria to ports along the lines of traffic not followed by pilgrims, as to Ancona, Valencia, and to Southampton. It is impossible to say that the pilgrims had no part in the diffusion of cholera from Alexandria on the shores of the Mediterranean, but the evidence indicates that the diffusion was mainly, if not wholly, effected by persons originally coming from the new centre of dissemination set up at Alexandria. The direct agency of the pilgrims in carrying onwards the disease ceasing after they had embarked at Alexandria, or being inseparable from the concurrent agency of fresh carriers coming from the new centre of infection there, the further history of the diffusion on the shores of the Mediterranean will be treated in another section.

2. *The Diffusion along the Northern Pilgrim Land-Routes.*

The diffusion to Medina, and Northern Arabia.

The facts ascertained respecting the diffusion of cholera from Mecca along the northern pilgrim land-routes are very few and incomplete. At this time attention was so much absorbed in the spread of the disease in Egypt and Syria, and in its extension to Europe, that little heed was given to the facts of its prevalence or absence in the caravans travelling by land northwards. Moreover, the pilgrimage was not subjected in 1865 to such close sanitary observation in the Hejaz as it is now subjected to, and which has admitted since that year of a fairly detailed knowledge of the sickness and mortality among the pilgrims in their progress from Mecca to their different destinations while within the Ottoman and Egyptian dominions.

Dr. Martini, a physician in the service of the Egyptian Sanitary Administration, visited Yembo in the second week of June (1865). He found there 5,000 pilgrims waiting embarkation without any prevalent sickness among them, and received information from, he believed, trustworthy sources that cholera had ceased among the pilgrims after they had left Mecca.

The Damascus caravan entered that city on its return journey on the 17th July, having started from Mecca on the 6th or 7th June. The caravan had been medically examined at Mejarib before entering the city, and it was certified that no case of cholera had occurred among the pilgrims since they had left Mecca.

Seven caravans on their way to Lower Egypt, by way of Suez, were examined at El Wedj. The first, consisting of 850 pilgrims and 2,800 camels, entered El Wedj on the 11th June, no ailment existing among the pilgrims, except two cases of diarrhœa. The second caravan, consisting of 1,000 pilgrims and 1,500 camels, entered El Wedj on the 8th July, and excepting three cases of diarrhœa the pilgrims were healthy. The three other caravans, containing together 2,950 pilgrims and 4,500 camels, all entered El Wedj on the 9th July with but three sick of diarrhœa among them.

On the 4th July 1865 the Sanitary Office at Bagdad received information that vomiting and diarrhœa had been observed among the pilgrims returning from Mecca by way of Medina and the desert route

to Nedjef (Meshed Ali). This route divides, after leaving Medina, into two branches, which unite again at Haiel, in Jebel Shomer. The western branch proceeds by way of Khaibar, the eastern by way of Aneyzeh, Bereydeh, and Kaseem. At Bereydeh this last-named branch joins the route leading from Haiel to Riad, and here pilgrims returning from Medina into Central Arabia, and travelling through Nejed and Hasa homewards, diverge from the northern desert route for Nedjef. Cholera, following upon the passage of pilgrims from Mecca, is reported to have appeared in succession at Medina and Aneyzeh, and to have passed from the latter town to Riad. Here the disease entered the eastern pilgrims' land-route, of which, indeed, the route from Riad to Aneyzeh is a branch. Nothing is known of any prevalence of the disease in Jebel Shomer, but the pilgrims who travelled to Nedjef along this route, as the pilgrims who travelled by the land routes to Yembo, El Wedj, and Damascus arrived at their destination free from the disease.

3. *The Diffusion along the Eastern Pilgrim Land-Route.*

The diffusion to Central and Eastern Arabia.

The history of the diffusion along this route, although it can be described only in general terms, is of peculiar interest. In 1865 Lieut.-Colonel (now Colonel Sir) Lewis Pelly, then Her Majesty's Political Resident in the Persian Gulf, visited Riad, the capital of Nejed, Central Arabia. He was accompanied, among others, by Mr. Colvill, then attached as civil surgeon to the Bushire Residency, and left Koweit (Grane) for the interior on the 18th February, returning to the Gulf by way of Okair on the 18th March. At this time although cholera was extending along the coast of Mekran, and was probably present in Southern Arabia, and certainly present in the northern Somali country, not a whisper of the disease was heard in Riad. On the return to the coast the expedition sighted a party of pilgrims for Mecca, who had landed at Kateif, and were on their way to Riad. Colonel Pelly estimated the number of pilgrims passing annually through Nejed to Mecca as 32,000, of whom 2,000 entered the country by way of Koweit, the remainder by way of the ports of Hasa. At the time when cholera appeared in Nejed, Eastern Arabia, north of Oman, was free from disease. There is no information regarding the pilgrims who travelled homewards on the direct route from Mecca to Riad, but it is to be inferred from the events which happened on the other pilgrim-routes that they would not be wholly inactive in propagating the disease. The outbreak of cholera in Riad was severe, and from that town the disease was propagated in a north-east direction to the head of the Persian Gulf. Mr. Colvill, in the despatch to which I have already referred (see foot-note, p. 22) describes the progress of cholera from Riad as follows :—"Cholera now passed north-north-"east through the various tribes under the Wahabee rule, to a small "place called Jaharah. This is simply a large farm belonging to a "merchant of Koweit. It is 20 miles west of that town and 70 miles "from Busreh (Basra). It consists of three enclosures close together, "containing about 200 inhabitants; but at this time the Mutyr and "Beni-Khalid tribes, tributaries of the Wahabees, were encamped round "it to the number of 4,000 or 5,000 tents, with the intention of "attacking a portion of a Bedouin tribe called the Dthefye, which was "encamped at Isphuan, a watering-place 30 miles on the road to "Busreh. Cholera visited the Mutyr and Beni-Khalid tribes severely. ". . . The epidemic next appeared, on the 25th and 26th of August, "at Duaseh. This is a village situated on the right bank of the Shat-

"el-Arab, about 40 miles below Busreh."* Cholera was first recorded in Basra on the 27th August; and its presence in Koweit and Mohammera was reported early in September.

Meanwhile the pilgrims in various groups were making their way to Nedjef and Kerbella along the northern route through the desert, and along the route through Nejed, some on the latter route by way of Koweit, others by way of the Hasa ports. The pilgrims began to arrive in Nedjef about the middle of July, and the last caravan entered that town towards the close of August or at the beginning of September. All the caravans were reported free from choleraic disease on their arrival at Nedjef, except the last, among which two cases were observed. This caravan had passed up the Euphrates at a time when cholera was present on both banks of the river, preceding caravans which had followed this course, before the appearance of the disease in the vicinity of Basra, having, it is reported, had no cases. The great caravan, as the Damascus caravan, was reported free from sickness during the whole of its journey, but it was ascertained that several deaths had happened on the way, although neither the cause of the deaths, nor the period of the journey at which they occurred, was discovered. After leaving Nedjef and Kerbella, the pilgrims who took the road by way of Hillah and Bagdad to Persia showed no signs of infection in the different towns through which they passed, and those who stayed in Bagdad remained free from the disease.†

On the eastern pilgrim land-route, as on the northern sea route, the propagation of cholera was mainly effected from the secondary centres of the disease set up by the pilgrims in the earlier part of their journey. The disease, so to speak, lagged behind the different groups of pilgrims as they advanced on their journey, and those who travelled by Jebel Shomer, were apparently disembarrassed of it before they had passed the desert, and those who had passed through Nejed before they had reached the Euphrates.

4. *The Diffusion along the Southern and Eastern Pilgrim Sea-Route.*

The International Sanitary Conference was of opinion that cholera had been carried to the Euphrates, and scattered on the southern and eastern coasts of Arabia by the pilgrims who returned homewards by the southern and eastern sea-route. At the time when the pilgrimage ended, and the return of the pilgrims commenced, cholera, as I have already shown, had been prevalent in Hadramaut, and was still prevailing on the east coast of Africa and in the interior of the Somali country, and on the coast of Mekran and the neighbouring Persian coast. Information received at Aden during the presence of the disease in the Hejaz indicated wide prevalence and great mortality in Hadramaut; and during July it was known at Bagdad that the malady was very fatal at Mascat, and probably in other parts of Oman. While cholera was thus

* See also on this subject, Mr. Colvill's "Sanitary Report on Turkish Arabia," published in the *Transactions of the Medical and Physical Society of Bombay*, 1871, p. 60. At the time when Mr. Colvill wrote his despatch of the 19th January 1866, he was unaware of the presence of cholera on the coast of Oman at the same time that it was prevalent on the opposite Persian coast, also of the occurrence of the disease at Koweit, and of the precise date of its first recognition at Basra. The statements in the despatch with regard to the two latter places requiring to be modified, I have not quoted them.

† Mr. Colvill, in the despatch previously referred to, states that cholera on the route to Nedjef and Kerbella was most severe among the pilgrims. The statements in the text are made on the authority of the reports furnished, at frequent intervals, from the different localities, to the Ottoman Sanitary Office at Bagdad, at the period to which they refer.

active in Southern Arabia, it was also extending along the northern coast of the Gulf of Oman and the Persian Gulf, Bunder Abbas suffering at the same time as Mascat. What part, if any, pilgrims returning by the sea-route to the coasts of Hadramaut and the Persian Gulf may have played in adding to the prevalence of previously existing cholera there, by importations of the disease from the Hejaz, it is impossible to say. Equally impossible is it to state what part importations from Oman and from the opposite Persian shore may have played in the development of cholera on the banks of the Shat-el-Arab, and of the Euphrates.

After the appearance of cholera at Basra in August, the disease passed along the Shat-el-Arab and the Euphrates, attacking the different towns in succession as it ascended the stream. At the same time cholera was descending the valleys of the Euphrates and Tigris, having entered them from northern Syria, high above the confluence of the two streams. The progress of the disease in the valleys of the two rivers, and its subsequent extension into Persia, will form the subject of a separate section.

III.—The further Diffusion.

I have now to take up the story of the diffusion at that point where the influence of the pilgrims returning homewards from Mecca as carriers of the epidemic had ceased, or was no longer to be distinguished from that exercised by persons coming from the new centres of diffusion set up by them. In dealing with this part of my subject I propose to describe the several principal developments of the diffusion in the following order, as, perhaps, best admitting of a connected view of its progress :—

1. The Diffusion to Europe and prevalence there from 1865 to 1869.
2. The Diffusion to the South and East Coasts of the Black Sea.
3. The Diffusion to the West Indies and North America.
4. The Diffusion to North-western Africa and to West Africa.
5. The Diffusion in Egypt, Nubia, and East Africa.
6. The Diffusion in Syria and Western Anatolia.
7. The Diffusion in Mesopotamia, Kurdistan, and Persia, and incidentally
   - (*a*) The Diffusion in Arabia and Nubia in 1871–72 ; and
   - (*b*) The Diffusion in Central Asia, 1871–72.

The recurrence of cholera in Europe in 1869, and its prevalence on the Continent during the four succeeding years, will form the subject of a separate section.

I.—The Diffusion to Europe and prevalence there from 1865 *to* 1869.

The Diffusion to Europe. I. The antecedents. Europe taken by surprise.

The Antecedents.—Europe was taken by surprise when cholera appeared in 1865 on the south coast of the Mediterranean, at Alexandria, and began thence to extend rapidly to the southern and eastern shores of that sea. It was not, indeed, until the disease had effected a lodgement in several parts of the Continent that the attention of governments and the public was fully aroused. In no previous epidemic had Europe been attacked from the sonth, and any danger from this source was looked for along the routes which cholera had travelled in the earlier invasions of the Continent. There had been no information of epidemic prevalence of cholera in Western India in 1864 and the beginning of 1865, following upon a movement of the disease through the Central Provinces, from the Lower Provinces, Bengal. Nor would such information have availed much had it been accessible ; for in the

event of the disease being propagated beyond the shores of Western India, its propagation would have been expected to follow the route which was traversed by the first great epidemic which invaded Europe in 1830, namely, along the Persian Gulf, and through Persia to the Caspian Sea and Russian frontier. But it was not until after the close of 1865, when cholera had already spread widely in Europe and crossed the Atlantic, that the real significance of the movements of cholera in Western and Central India in the years 1863–64 could have been fully understood. As already stated in a previous part of this report, 1865 was the first year of attempted registration of deaths among the civil population of the Bombay Presidency, and I may add, also, of parts of the Bengal Presidency. The following year (1866) a beginning of registration of deaths was made in the Madras Presidency. From and after this year only dates the possibility of viewing comprehensively the movements of cholera in India; but it may be still questioned whether it is even yet practicable to forecast the probable future of these movements in reference to other countries.*

No indications of coming pestilence admitting of forecast.

Not only from the experience of previous epidemics but, also, from the then necessary want of acquaintance with what was happening in India, was Europe unprepared for the invasion of cholera from the south, but there was nothing in the general state of health of the populations of the Continent to lead to the supposition that pestilence was impending. No augmentation of diarrhœal disease or marked deterioration of public health such as was believed to have preceded the epidemics of cholera of 1832–33, and of 1848–49, marked the appearance of cholera in 1865. It is true that in Egypt and in Southern Arabia the outbreak of cholera coincided with a period of much privation, arising from murrain among flocks and defective harvest from drought, but like privation was not present elsewhere among the communities attacked. It is true, also, that murrain had preceded cholera in Syria and in Europe, but its association with that epidemic was incidental not common and general. It is true, moreover, that in several places the coming of the epidemic is believed to have been foreshadowed by unusual prevalence of zymotic maladies and especially of gastro-intestinal affections. Thus, in Malta and Gozo, Dr. Sutherland has shown that of the class of maladies last named, there came under treatment in the public medical institutions of the islands no less than 6,263 cases during the first six months of 1865, as compared with 4,166 cases during the corresponding period of 1864.† He describes also an increase in the prevalence of fevers during the first six months of 1865. "These facts," he observes, "are sufficient to show that long before

The antecedents in Malta,

* See on this subject, and especially with reference to India, Dr. Bryden's elaborate report on "*Cholera Epidemics of Recent Years viewed in relation to former Epidemics: A Record of Cholera in the Bengal Presidency from* 1817 *to* 1872." *Calcutta*, 1874.

† Return of the Number of Cases of certain kinds of Sickness observed in the Public Institutions of Malta and Gozo during the first six months of 1864, and the corresponding period of 1865:—

	1864.	1865.
Dyspepsia and gastricism	1,915	2,086
Colic	595	777
Diarrhœa	1,042	1,243
Dysentery	465	559
Sickness and vomiting	149	180
Enteritis or gastro-enteritis	1,308	1,418
All other diseases	18,383	20,547

—*Report on the Sanitary Condition of Malta and Gozo with reference to the Epidemic Cholera in the year*, 1865, p. 12.

"cholera began its course towards the north-west there were indications "of a changed condition of the public health in Malta" (p. 14); and after giving an account of two groups of choleraic cases which occurred in May, he adds: "It appears to me scarcely possible to escape "from the conclusion that long before cholera appeared in Malta, "possibly before its first outbreak in Arabia, the earliest wave of the "coming epidemic had passed over these islands" (p. 15). But while, according to Dr. Sutherland, the coming epidemic was thus clearly foreshadowed in Malta, no change in the public health presaged its appearance in Gibraltar. In his report on the disease there in 1865, he shows that the number of cases of gastro-intestinal affections recorded in public medical practice among the civil population during the first six months in 1865 was less than during the corresponding period of 1864 (namely, 1,097 as compared with 1,129).* There was "no great "amount of diarrhœa among the troops;" no febrile affections are referred to; and, except three cases of violent diarrhœa among children in the town, no special events of sickness to note. He draws attention to "a slight increase of visceral affection" (referring apparently to the columns headed "sickness and vomiting" in the subjoined Table) in the earlier months of 1865, chiefly in May, June, and July of this year; "but," he adds, "there is nothing special in the facts, except the "apparently large amount of gastric affections prevalent in Gibraltar "at all times, and the probable influence of this state of health in pre-"disposing people to attacks of cholera during epidemic seasons" (p. 2). Inspector-General Rutherford, M.D., writing of the state of public health in Gibraltar in 1865, previous to the appearance of the epidemic there, says, "The summer of 1865 in Gibraltar, up to the "time when cholera first appeared, viz., 18th July, was regarded as "unusually cool and agreeable, and the somewhat exceptional good "health of the inhabitants was a subject for congratulation."†

in Gibraltar.

The absence of all fore-shadowing of the epidemic at Gibraltar, can hardly be reconciled with the suggested presence of such fore-shadowing at Malta. The facts which have been interpreted as presaging the appearance of cholera in the latter island, are, indeed, to be regarded rather as coincidental than precursory.

Again, MM. Didiot and Gués have endeavoured to show that prior to the appearance of cholera in Alexandria choleraic disease existed in Marseille, and that the outbreak of the epidemic in the latter town was preceded by "une constitution médicale cholérique."‡ The facts they

in Marseille.

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* Return showing the Number of Cases of certain kinds of Sickness under observation during the first six months of 1864, and during the corresponding period of 1865, at the Civil Hospital, Gibraltar:—

Months—January to July inclusive.	1864.	1865.
Dyspepsia	446	420
Colic	268	231
Diarrhœa	252	239
Dysentery	47	26
Sickness and vomiting	116	181
All other diseases	8,525	7,969

—*Report on the Epidemic of Cholera at Gibraltar in the year* 1865, p. 2.

† General Report upon the Cholera Epidemic in Gibraltar, during the Summer and Autumn of 1865.—*Statistical, Sanitary, and Medical Reports of the Army Medical Department*, Vol. vi., p. 350.

‡ *Rapports sur l'Origine du Choléra à Marseille en* 1865. Par Dr. P. A. Didiot and Dr. Ch. Gues, Marseille, 1866. "Le Dr. Didiot," writes Dr. Gués, "établit que "le choléra, dont l'éxistence officielle ne date, il est vrai, que du 23 Juillet, régnait "cependant à l'état sporadique depuis la fin du mois de Mai," (p. 26.)

advance in support of their conclusions simply show that deaths from infantile cholera, which, as they properly remark, is "à la vérité, "fréquente à Marseille," and from so-called "sporadic" cholera, are apt to occur in Marseille during the months of May and June, as in perhaps every city and town of southern and central Europe. Certainly they state that the cases of these diseases which occured in Marseille in May and June 1865 were characterised by unusual severity, but this statement is inconsistent with such facts as are known regarding the mortality from the malady. Dr. Seux, as the result of an examination of the registers of the Civil Hospital and of his own observation during the months of May and June, states: "Dans ce relevé, on ne rencontre "pas un seul cas de diarrhée aigué; dans la clinique de la ville, on "observait à cette époque le même genre de maladies qu'à l'hôpital; "les diarrhées, habituellement très fréquentes à l'arrivée des chaleurs, "l'étaient cette année moins que de coutume; en un mot, l'état "sanitaire de la ville était excellent." He adds also the following observations from data furnished to him by Dr. Jubiot, principal medical officer of the Military Hospital: "Durant les mois de Mai, Juin, et Juillet "1864, M. Jubiot a eu à soigner dans cet établissement 43 diarrhées; "tandis que durant les mêmes mois en 1865, il n'en a eu que 25 cas, ce "qui fait 18 cas de moins pour cette année. Il est donc évident que "dans le mois de Juin, Marseille se trouvait dans d'excellentes condi-"tions hygiéniques et sanitaires. Il est aussi parfaitement démontré, "par les détails qui précèdent, que la constitution médicale regnante "n'indiquait pas l'invasion prochaîne de choléra."* (p. 7.)

In England, although the introduction of Russian Steppe murrain early in 1865, after the country had been free from the epizöotic for a century, the threatenings of the rare malady epidemic cerebro-spinal meningitis prevalent at the beginning of the year in North Germany, and the unwonted appearance of relapsing fever during the winter in St. Petersburg had arrested public attention and excited the vigilance of the Government in the spring, it does not appear to have occurred to any-

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* Le Choléra dans les Hôpitaux Civils de Marseille pendant l'Épidémie de 1865. Par V. Seux, Médecin-en-Chef des Hôpitaux, &c. Paris, 1866.

Dr. Ménécier (*Histoire de l'Epidémie de Choléra à Marseille* 1865) gives the following statistics from the military hospital, furnished to him by Dr. Jubiot, and he precedes them with the observation:—"Les cas de diarrhée ont été si rares cette année, que le mot *diarrhée* n'a figuré qu'à partir du mois Août en tête de relevés d'observations météorologiques envoyés mensuellement au ministère de la guerre par l'hôpital militaire."

		1864.		1865.		
		Cases.	Deaths.	Cases.	Deaths.	
Diarrhœa	May	4	1	5	1	
	June	11	0	4	0	
	July	17	0	8	1	
Dysentery	May	2	0	4	1	
	June	6	0	4	0	
	July	1	1	8	1	
Cholerine	May	2	0	0	0	
	June	2	0	5	0	
	July	7	0	5	0	
Cholera	May	0	0	0	0	
	June	0	0	0	0	[18th June 1st case observed among civil population.]
	July	0	0	2	1	[23rd July officially recognized among civil population.]

one to see in these events presages of the extension of yellow-fever and of cholera to our shores later in the year. In fact the different occurrences were parts of contemporaneous rather than of successive phenomena.

THE ANTECEDENTS OF THE DIFFUSION, 1865.

in Southampton,

No notable change in the public health of the localities affected preceded the appearance in September either of yellow-fever at Swansea, as shown by Dr. Buchanan,* or of cholera at Southampton, as shown by Dr. Parkes.† Dr. Parkes submitted this question to very careful consideration, but neither in respect to meteorological states nor in respect to sickness among the population was he able to detect the existence of any peculiar "epidemic constitution", so-called, preceding or co-existing with the cholera. Taking the mortality from diarrhœa as the best indication of the operation of any generally existing cause favouring the production of cholera, he found that the annual average number of deaths from diarrhœa in the district of Southampton during the four years 1861–64 was in September 12·75, and in October 2; and that in September 1865, the deaths were 13, and in October 1865, when cholera was chiefly prevalent, they were only 7. In October 1864 the number had been 5. The inference from the records of mortality was confirmed by the information received from medical practitioners as to prevalence of diarrhœa, and Dr. Parkes observes: "Considering "then, that in the larger part of the town there was no excess of cases "of diarrhœa; that there was no increase in the deaths from diarrhœa "in September, and only an unimportant increase in October, and that "during a period of public alarm there are always persons who apply "for advice who in ordinary times would not think it necessary to do "so, I cannot believe that there is any evidence of a general diarrhœa-"producing cause hanging over Southampton."

in Theydon Bois,

I made close inquiry as to diarrhœal antecedents in the outbreak of cholera at Theydon Bois, Essex, in September 1865, and I included other parishes of the Epping Union in the inquiry as well as the parish of Theydon Bois. The result proved that there had been no unusual prevalence of the disorder among the population, and that the cases which had occurred differed in no respect from those observed ordinarily in autumn. Two cases of common sporadic cholera had taken place in Epping, and several in the Haslow and Matchingham district about the time of the outbreak. But none of these cases proved fatal or presented any peculiar symptom. During the second week of the outbreak at Theydon Bois, there was an apparent prevalence of diarrhœa in that parish, arising from the energetic measures which had been taken in urging the population to apply for medical advice upon the occurrence of any, even the slightest, disturbance of the bowels.

and in London.

I further examined this question with reference to London, in my report on cholera in the Metropolis in 1866, especially in the eastern districts.‡ In that report I considered it first with regard to the prevalence of diarrhœa, as measured by the mortality registered under that term previous to the outbreak; and, next, with reference to reported cases of choleraic diarrhœa preceding it. In regard to diarrhœa, I discussed the question not only in respect to the outbreak of 1866, but also to the outbreaks of 1848–49 and 1853–54. From this discussion it followed that each epidemic of cholera since 1838 had been preceded

The prevalence of diarrhœa in 1866, in relation to Cholera, as observed in London.

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* *8th Report of the Medical Officer of the Privy Council*, p. 440.

† *Ditto.*

‡ *9th Report of the Medical Officer of the Privy Council*, p. 267, s. 4; and p. 217. s. 5.

by an excessive development of diarrhœa, but every excessive development of diarrhœa had not been accompanied by epidemic cholera. Thus in 1857, 1859, and 1861 the mortality from diarrhœa was unusually great. In the first-named year the deaths from the disease largely exceeded those from the same cause which preceded the epidemic of 1848–49. In 1859 the mortality from diarrhœa surpassed that which occurred during the second and principal year of the epidemic of 1853–54; and in 1861 the deaths from the same cause were in excess of those of the first year of the epidemic.

The absence of constant concurrence between years of excessive prevalence of diarrhœa and years of epidemic cholera was not the only point of deviation between the phenomena. When they occurred together the large amount of diarrhœa accompanying and developed during the progress of the epidemic did not merge insensibly into, or seem to arise directly and by steadily increasing augmentation out of, as a further exaggeration, the diarrhœa immediately preceding it. It appeared, indeed, to be a superadded phenomenon following a special law of increase and decline.

Immediately prior to the development of epidemic cholera in London in 1866 there was a remarkable subsidence of diarrhœa. A like phenomenon preceded the epidemics of 1848–49 and 1853–54. In the epidemic of 1866, the two first cases were recorded on the 26th June. The following table shows the mortality from diarrhœa during the four weeks of June and 1st week of July:—

Deaths from Diarrhœa.

	1865.	1866.	Average of corresponding Weeks, 10 years.
1st week June	44	22	18·9
2nd „ „	93	20	29·1
3rd „ „	187	43	48·8
4th „ „	184	67	58·7
1st week July	301	102	95·1

The little prevalence of diarrhœa in the metropolis immediately preceding the earliest cases of the epidemic in 1866, as indicated by the mortuary returns, was confirmed by an examination of the state of diarrhœa among the sick poor, during the months of May, June, and July, in the districts which suffered most from the outbreak.

Dating the actual commencement of the epidemic of 1848–49 from the 40th week of 1848, in the four preceding weeks, the 36th, 37th, 38th, and 39th, the mortality from diarrhœa had fallen markedly, and in the three latter weeks largely below the average. Dating also the active commencement of the epidemic of 1853–54 from the week in 1853 in which the deaths from cholera passed above the average, the 37th (the mortality from that time keeping persistently and conspicuously above the average to the close of the year), in the 31st, 32nd, and 34th weeks of that year the mortality from diarrhœa fell largely below the average of preceding years. A similar subsidence below the average did not occur, it is interesting to remark, in the corresponding weeks of 1854, or anterior to the recrudescence of the epidemic of that year. Subsequently to the outbreak of the epidemic of 1853, the weekly mortality from diarrhœa kept steadily above the average of the preceding three years until the recommencement of the activity of cholera in 1854. The mortality fell to a lower point during the period from the 26th to

the 27th week inclusive, but always kept above the average. In the last week of the period the epidemic again became active, and subsequently the mortality from diarrhœa rose and sunk, with its development and declension.

Deaths from Diarrhœa.

Week of Year.	1848.	Average of corresponding Weeks, 5 years.
33rd	81	66
34th	63	66
35th	79	66
36th	61	66
37th	42	66
38th	46	66
39th	44	66
40th	47	21

Week of Year.	1853.	1854.	Average of corresponding Weeks, 3 years, 1850-52.
30th	81	84	70·1
31st	110	142	134·2
32nd	139	195	167·0
33rd	126	192	165·1
34th	137	214	156·1
35th	152	243	139·0
36th	131	276	124·0

I argued from the foregoing data that there was no essential etiological connection between the diarrhœa which preceded and the diarrhœa which accompanied (and was, in fact, a part of) the epidemic of cholera in 1866, and the two previous epidemics. The diarrhœa which accompanied the epidemic of 1866 sprang up contemporaneously with the first cases of cholera, grew in extent with the growth of the epidemic, and diminished with its decline; and probably was altogether independent of, although associated with the current sporadic diarrhœa of the country.*

* Dr. Edward Ballard makes the following observations on diarrhœa observed in Islington during 1866, in his "Report of the Results of an Analysis of Records of Sickness kept in Islington during the 12 years, 1857 to 1868 inclusive."—(11*th Report of the Medical Officer of the Privy Council.*)

"The exceptional cholera year 1866 deserves particular notice, chiefly because the summer diarrhœa, the recorded cases of which amounted in the three months, July, August, and September, to 1,879, did not correspond to the meteorological conditions existent during its prevalence, neither did the summit of the diarrhœal wave correspond with that of the wave of epidemic cholera as it presented itself in this district. The mean temperature of the 13 weeks of summer was positively low, viz. :—58·7°, that of the four weeks of July being 61·5°, of the four weeks of August 58·9°, and of the five weeks of September 56·9°. The humidity of the atmosphere also was great for the season, and the rainfall considerable. It was therefore impossible to fail in recognising in this season the operation of a cause other than the ordinary meteorological causes of summer diarrhœa, producing the enormous amount of diarrhœa observed:—for the cases recorded upon the books, numerous as they are, did not represent anything like all that were admitted under treatment. A consideration of the temperature of the season week by week will put this in a still clearer light. In the fourth week of June the mean temperature was 58·1°, and in the fifth week it suddenly rose to 66·3°, in the week following it fell 10·0°, to rise in the second

App. No. 1.

On Cholera, by Mr. J. Netten Radcliffe.

The prevalence of diarrhœa in relation to cholera in England and Wales.

The Antecedents of the Diffusion, 1865.

I have since examined the relationship of the mortality from diarrhœa to that of cholera, in England and Wales, during the past 20 years, 1847–67. This period includes the three epidemics of 1848–49, 1853–54, and 1866. The results correspond so closely with those obtained by the examination of the like relationship in the metropolis, that it is unnecessary to describe them in detail, and I give the annual figures in the Appendix (Table I.). Since 1867 there has been a considerable growth in the mortality from diarrhœa, and in 1868 the numbers of deaths registered from this cause in England and Wales exceeded, as well in gross number as in proportion to population, those of any previous years. The mortality from diarrhœa in 1865 was, in England and Wales, 28,531, the greatest number recorded to that time in any year since the establishment of registration. In 1868 the number of deaths from diarrhœa in England and Wales was 29,821. Moreover, in 1870 and 1871, the deaths from diarrhœa proportionately to population had, with the exception of 1868, been exceeded in three years only of the period under consideration, namely, in 1854, (when cholera was epidemic), in 1857, and in 1866. The deaths from diarrhœa registered in the two years respectively were 25,311 and 24,140. These later great developments of diarrhœa presaged no epidemic of cholera, and they appear to confirm the conclusion arrived at from the examination of the data relating to the metropolis, that the diarrhœa of ordinary seasons and the diarrhœa accompanying epidemics of cholera are phenomena determined by a different series of causes having no etiological relations except such as are secondary.

Preceding the outbreak of cholera in the metropolis in June 1866, several deaths from "choleraic-diarrhœa," and one certified as from "Asiatic cholera," had been registered. Three of these cases had occurred in April, and seven, including the case of so-called "Asiatic cholera," in May. In 1865 also, deaths from "choleraic-diarrhœa" and from so-called "Asiatic cholera" had been registered, the earliest (deaths from the first-named malady) in the week ending the 22nd July. Of these cases I wrote at the time, "It is not easy to assign a determinate value to the term "'choleraic-diarrhœa.' As a cause of death it has for some time appeared "annually in the weekly returns of the metropolis. . . . . On any "view of the probable relations of these cases to the subsequent "epidemic it is requisite that they should be noted. It is found im-"possible to disentangle at the beginning of the outbreak cases of a "quasi-epidemic character from those of a true epidemic character, and "to shut out absolutely a theory of development of the latter by grada-"tion out of the former; it is equally impossible to set aside the fact of "exposure of the metropolis to continuous transmission of the epidemic "malady from the early autumn of 1865 to the early summer of 1866. "The history of the outbreak, where defective, as here, must be com-"pleted by deductions drawn from the history of the general epidemic

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week of July 12·0°, to 68·2°, the highest weekly mean of the year. For four or five weeks after this it progressively fell to 58·0°. The month of June was not remarkable for diarrhœa, and gave no promise, had not cholera been anticipated, of a heavy diarrhœal epidemic. In the fifth week of June only 28 cases were recorded; in the first week of July there were 55 cases, and they increased week by week thus: 43, 99, 115, 165, 272, 313, the last number being attained the third week of August, that is five weeks after the maximum temperature had been reached, the steady increase of cases having gone on concurrently with a steady decline of mean temperature below 60·0°. Our maximum of weekly cases of diarrhœa was attained on the second week after the first fatal week of cholera in London, which was also the week in which the largest number of cases of the disease was observed in Islington. Diarrhœa then increased as cholera declined."—(pp. 51 and 54.)

" of which it forms a part." * Since this was written I have had to give particular attention, as part of my official duties, to cases of diarrhœa and choleraic disease of a quasi-epidemic character, in view of threatened extensions of the true epidemic disease. As the result of several investigations it has appeared to me that very much of the difficulty here arises rather from phraseology than from fact. A tendency has grown up during the recurring epidemics of cholera to apply the terms proper to the period of epidemic prevalence to sporadic forms of the disease, as if fatal cholera and fatal serous diarrhœa were diseases unknown to England prior to the intrusion of Asiatic cholera. This looseness of phraseology is to be deprecated, as still further complicating an otherwise very complicated subject. With regard to the question now under consideration, namely, the significance of these cases as presaging epidemic cholera, I have failed to discover any closer relation between their occurrence and the appearance of epidemics of cholera than that which exists in respect to common diarrhœa.†

I have examined the question under consideration with reference also to the prevalence of "fevers," and generally of zymotic diseases previous to the appearance of epidemics of cholera in this country. I give the data in the Appendix (Table I.). They do not appear to me, any more than the data derived from the mortality from diarrhœa, to yield evidence of a so-called "epidemic constitution" foreshadowing the different invasions of the pestilence.

The Diffusion.—On the 2nd June 1865 the first observed case of cholera occurred in Alexandria. On the 11th June the presence of the disease in the city was officially recognized. On the 12th June, in consequence of the appearance of cholera, the issue of foul bills of health to ships leaving the port began. The Italian steam vessel, "Principe di Carignano," which started for Ancona that day, had inscribed upon its bill of health, "Quelques cas de cholera ont été observé "à Alexandrie du 10 au 12 juin present mois." On the 14th June the appearance of cholera at Alexandria was made known through the telegraph to the different maritime nations of Europe by their representatives there.

The Diffusion from Alexandria to Europe.

The dates of the subsequent appearances in the Mediterranean and in Europe, together with the dates of such appearances elsewhere, as it is desirable to note for the purpose of marking contemporary diffusion, are given in the following list. Places not in Europe are printed in italics :—

June 18th. Marseille (officially recognized 23rd July).
„ 20th. Malta.
„ 24th. *Smyrna.*
„ 28th. Constantinople.

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* *9th Report of the Medical Officer of Privy Council*, p. 272.

† If I may trust to my own experience, commencing with the epidemic of 1848–49, the term "choleraic-diarrhœa" has come into common use since the epidemic of 1854. The instructions as to returns of cases prepared in that year by the Committee for Scientific Inquiries of the General Board of Health, directed that "the "following *degrees or stages of the disease* should, where possible, be distinguished," namely (1) "simple diarrhœa," (2) "choleraic-diarrhœa," and (3) "cholera." "Choleraic-diarrhœa" was described thus: "Alvine discharges very copious, watery, "still tinged with bile. Vomiting generally present, but not continued or urgent. "Cramps absent." Choleraic-diarrhœa here meant a form of malignant cholera, and in this sense the term is adopted in the nomenclature of the Royal College of Physicians; but it has become a too common practice to apply it now to forms of sporadic diarrhœa, which in certain aspects are like unto cholera.

July	1st.	*Beyrout*, city (29th June, lazaretto).
,,	,,	*Jaffa.*
,,	7th.	*Cyprus* (Larnaka, town : lazaretto, 26th June).
,,	,,	Ancona.
,,	8th.	Valencia.
,,	,,	*Dardanelles*, town (29th June, lazaretto.)
,,	18th.	Gibraltar.
Aug.	1st.	*Damascus.*
,,	,,	*Trebizond*, town (25th July, lazaretto).
,,	2nd.	Sulina, town (30th July, lazaretto).
,,	,,	Kustendji.
,,	4th	Tultcha.
,,	9th.	Novorossiisk (Caucasia).
,,	10th.	Borchi (district of Balta, Government of Podolia, South Russia).
,,	,,	Odessa, lazaretto (18th officially recognized in the town).
,,	11th.	*Aleppo* (officially declared).
,,	19th.	Palma.
,,	22nd.	*Erzerum.*
,,	27th.	Altenburg (Saxony).
,,	29th.	Kertch.
Sept.	4th.	*Algiers.*
,,	17th.	*Bagdad.*
,,	,,	England : Southampton.
,,	18th.	Paris (Puteaux).
,,	28th.	San Giovanni à Teduccio (near Naples).
,,	29th.	Prosecco (near Trieste).
Oct.	6th.	Naples.
,,	22nd.	*Guadeloupe.*
,,	28th.	Taganrog.
Nov.	22nd.	*Ward's Island, New York* (quarantine station, Lower Bay, 2nd November).

The relation of the several appearances in Europe to the outbreak at Alexandria, or to each other, is given in the following details :—

The appearance at Marseille, 18 June 1865.

Marseille.—On the 11th June the steam-ship "Stella" entered the harbour, having sailed from Alexandria on the 1st of the month. She landed 97 passengers, of whom 65 were Algerian pilgrims returning from Mecca, and according to M. Grimaud (de Caux), brought news of the existence of cholera in Alexandria.* On the evening of the 11th June the "Byzantine" arrived with 55 passengers. She had sailed from Alexandria on the 3rd June, and touched at Malta on her voyage. On the 14th June the "Marie Louise" and the "Syria" arrived, the former bringing 21 passengers, the latter the English mail and 106 passengers. On the 15th the "Saïd" reached the port with 190 passengers, who were sent to Frioul under observation and were not landed at Marseille until the 17th. This was the first ship submitted to detention. On the 16th the "Volga" arrived with 29 passengers, who were disembarked at once. On the 18th came the "Montfaloux," and the "Nyanza," the former having left Alexandria on the 10th and

* *Gazette des Hôpitaux*, 17th Oct. 1865.

bringing five passengers, the latter having left Alexandria on the 11th and bringing 46 passengers. Both these ships were subjected to observation two days before the passengers and crew were allowed to communicate with the shore. After the 20th arrivals at Marseille from Alexandria were subjected to quarantine.

From the 9th to the 20th June 549 persons were landed at Marseille from Alexandria and dispersed in different directions, of whom 308 had undergone no observation.

The Algerine pilgrims, during their stay in Marseille (period not stated), were lodged under canvas in Fort Saint Jean. Sixty-seven pilgrims had sailed from Alexandria in the "Stella," but two had died on the eighth day of the voyage. A third pilgrim died about five hours after landing at Marseille. The death of the latter was attributed, on insufficient evidence, to chronic dysentery; the deaths at sea are stated in the Report of the International Sanitary Conference, 1866,* to have been caused by cholera. Several of the pilgrims were indisposed at the time of landing.

While the pilgrims remained at Marseille they were an object of much curiosity to the frequenters of the quays. Many flocked to witness their appearance and habits, and they themselves moved freely about the streets in the vicinity of their temporary quarters.†

Two deaths from cholera occurred on board the "Saïd" in the course of her voyage from Alexandria, and on the 17th June, the day her passengers were disembarked at Marseille, Dr. Seux was summoned to one of them, a Jewish lady, suffering from diarrhœa which he considered to be choleraic. He saw other cases of a like nature on following days among fugitives from the epidemic at Alexandria. On the 18th June a well-marked case of malignant cholera occurred under the observation of Dr. Aïdé, the patient being a woman, aged 38 years of age, having charge of an infant, the child of a stoker on board a steam-vessel then in the port, and through whom she had frequent relations with the port. Other marked cases are recorded by Dr. Seux as happening during the remainder of the month of June and the beginning of July, and from the 23rd of that month it became no longer possible to shut the eyes to the fact that cholera was widely scattered in the city.‡ Nineteen cases were recorded in the nine days, 23–31 July, and the probable source of these was made a subject of careful inquiry by Dr. Ménécier. Of two of the patients no history could be obtained, but all the remainder, several of them being sailors and others workmen in the Imperial Mail Steam-Packet Service, were connected more or less closely with the port and the shipping.§

After the 23rd July the epidemic in Marseille slowly increased until the middle of September, after which period it declined, ending before the close of December. From the commencement on the 18th June, 1,952 deaths from cholera were registered. During the course of the

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* *Rapport sur la Marche*, &c., p. 52.

† "Pendant quelques jours, la horde des pélerins Arabes a, comme toujours, excité par sa malpropreté, par ses habitudes singulières, la curiosité des habitants des quais, et, comme toujours, soit qu'ils fussent allongés sur les dalles, soit qu'ils prissent leur dégoûtante nourriture, soit enfin qu'on les vit acheter à vil prix, ou ramasser dans les rues les rendus des marchés, une foule assez nombreuse entourait les sectaires de Mahomet."—*Étude sur le Choléra de Marseille en* 1865. Par Drs. J. Laugier et C. Ollive, Médécins des Bureaux de Secours, &c. Marseille, 1865, p. 20.

‡ *Le Choléra dans les Hopitaux Civils de Marseille*, 1865, p.p. 2–3 and 9–11.

§ *Historique de L'Epidémie de Choléra à Marseille*, 1865, p. 11, et seq.

epidemic several of the ships arriving from Alexandria in the port had had deaths from cholera on board.*

Malta.—The first case of cholera occurred in Malta (Valetta) on the 20th June.

On the 31st May the British steam-vessel "Ephesus," which had left Alexandria on the 26th May, arrived in the harbour of Valetta, with 235 pilgrims returning from Mecca on board, and was admitted to pratique. The next day she sailed for Tunis leaving 61 of the pilgrims at Malta. The master reported that during the voyage from Alexandria three pilgrims had died, one from "sore-leg," another from "costiveness," and the third from "senile exhaustion."† From the 1st to the 14th June inclusive, 14 steamers from Alexandria (the last arriving having sailed from Alexandria on the 9th June) touched at Valetta, and several landed passengers. Some of these vessels also carried pilgrims returning from Mecca. On the 14th the first news of cholera having broken out at Alexandria reached Malta; and on the evening of the same day quarantine was put in operation against vessels coming from that port. From the date of arrival of the first body of pilgrims in the "Ephesus" on the 31st May to the adoption of quarantine on the 14th June, 845 passengers had been brought into the port of Valetta from Alexandria, of whom 426 were pilgrims. Nearly all these persons landed during the stay of the vessels in the port, and several‡ were passengers for Malta.

Of the persons destined for Malta, of the persons who landed and remained there several days, including the 61 pilgrims, and of the persons who merely went ashore during the stay of their vessel in the harbour (of the latter almost necessarily), nothing whatever appears to have been ascertained as to their state of health at the time of and subsequent to landing.

The passengers first subjected to quarantine, 76 in number, of whom 51 were pilgrims, were landed at the lazaretto on the evening of the 14th June from three ships, the "Memnon," "the Cairo," and the "Nyanza." The "Memnon" carried 133 pilgrims from Alexandria, the majority for Tangiers. One pilgrim had died on the voyage from "bowel complaint." Fourteen pilgrims were landed at the lazaretto and 22 other passengers. The "Cairo" landed 47 passengers, 37 being pilgrims; and the "Nyanza" 7 passengers. On the 17th and 19th two steamers arrived at Malta from Alexandria, one of which landed at the lazaretto 30 passengers, the other one passenger. On the 20th June the steam vessel "Rhone," also from the same port, entered the harbour, with 147 passengers for Malta. The master reported that a passenger and a fireman had died from cholera during the voyage. On the 23rd one of the passengers landed from the "Rhone" was attacked with sickness and vomiting, and on the following day, the 24th, two other passengers, landed from the same ship, were attacked with diarrhœa. On the 23rd a man, landed from a ship, "the Christine," the day before, had also been attacked with diarrhœa. On the 26th of June there was another case of diarrhœa and vomiting in the lazaretto, the person having been landed there on the 23rd. None of these cases were fatal.

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* Thus, the *Tarifa*, 1 death; the *Vincent*, 1; the *Copernic*, 1; the *Cella*, 1; the *Asia*, 2; the *Saïd* (a second time), 2; the *Marie-Louise*, 3; the *Brésil*, 1; the *Oronte*, 1; the *Byzantin*, 1.

† *See* Dr. Ghio's Report, p. 11. Dr. Sutherland states as to the first-named cause of death, "mortification," not "sore-leg." (Report, p. 16.)

‡ Thirty-six, according to Dr. Sutherland. (Report, p. 16.)

On the 28th June the steamer "Wyvern," of 586 tons burden, five days out from Alexandria, landed 302 passengers at the lazaretto, and among them two cases of cholera. One of these cases died on the jetty, the other recovered in the quarantine hospital. In the course of the evening of the 28th a passenger, landed from the "Wyvern," was attacked with cholera in the lazaretto. These were the first cases of cholera in the lazaretto. Other cases followed among the passengers landed from the "Wyvern," not less than 11 occurring, with two cases of severe diarrhœa, and eight deaths, from the 28th June to the 17th July.

The first case of cholera among the population of the island, as already stated, occurred on the 20th June. On that day a child of one of the families of a detachment of Royal Artillery stationed in the former "Plague hospital," on Lazaretto Island, was seized with cramps, diarrhœa, and vomiting, and died after eight hours illness. This case is held to be the beginning of the outbreak in the island.

The quarters of the "Plague hospital" were described at the time as situated between two burial grounds, and surrounded by a wall 15 feet high. They were close, ill-drained, and near to the stagnant, foul-smelling shore of the Lazaretto creek. The inmates had been affected more or less with diarrhœa "for some time previously."

On the 22nd June a woman in the same quarters died after 18 hours illness, characterised by diarrhœa, vomiting, and cramps.

The day following (the 23rd) another woman, the mother of the child first attacked, was seized with similar symptoms and died after three days illness.

Four days afterwards (27th June) a second child died with choleraic symptoms.

During the night of the 27th–28th a workman (a civilian), who had been employed in lime-washing some rooms at the "plague hospital," was attacked with cholera at Casal Attard, and died on the 29th. This was the first known case among the civil population of Malta.

On the 1st July the detachment of Artillery was removed from the "Plague hospital" to the Salvatore Counter-Guard, beyond Floriana Parade, and near the Hay Wharf. The same day, after the detachment had taken up its quarters in this counter-guard, five of the soldiers' wives became ill, three suffering from decided cholera. The nature of two of the cases was doubtful. Of the three marked cases one died in 26 hours.

On the 3rd July a woman who had attended the last-mentioned fatal case, but who had not lived at the "Plague hospital," was seized with cholera after neglected diarrhœa of three days standing. She lived five days.

The same day the first case took place, at No. 96 Strada Vescovo, among the civil population of Valetta.

From this date the disease began to extend over the city and island.

Gozo.—The appearance of the disease in the island of Gozo is thus described by Dr. Ghio:—

"The island of Gozo, which lies at a distance of about three miles to the west of Malta, remained free from the disease till the 21st July. On that day Michele Cilia, aged 22 years, a seaman employed in a coasting boat, returned to Gozo after nine days stay at Malta. He arrived at Casal Xeuchia, the place of his residence, at about 3 p.m., suffering from diarrhœa. During the ensuing night he was seized with cholera, but recovered.

"On the 12th July, four cases occurred in two sisters of the said

Michele Cilia and two female neighbours who had frequented the house of Cilia during his illness.

"On the 25th, two other attacks followed among the inhabitants of the same Casal, one of whom also visited Cilia's house. After that day several other attacks took place.

"On the 2nd of August, the disease appeared in other Casals of that small island."*

The following Table shows the sickness and mortality caused by cholera in the two islands during the epidemic :—

—	Population.	Duration of Epidemic.	Cholera.	
			Cases.	Deaths.
	Civil.	1865.		
Malta - - -	(1861) 118,596	28 June—9 Nov. -	2,362	1,479
Gozo - - -	„ 15,348	21 July—24 Oct. -	545	252
	Military.			
Garrison :—	(Average.)			
Men - 6,105				
Women - 526	7,469	20 June—12 Nov.	199	142
Children - 838				
Lazaretto - -	—	—	—	—
Health Guards 134				
In communication with - 138				
Passed through quarantine, 14 June to 31 July - 2,031	2,303	23 June—29 July	23	14

The appearance at Constantinople, 28 June 1865.

Constantinople.—On the 28th June, at a time when, according to the Report of the International Sanitary Conference of 1866, "ni le choléra "ni rien de ce qui ressemble à ce qu'on appelle les signes précurseurs "de cette maladie, n'existaient à Constantinople," the Ottoman frigate, the "Mukbiri Surar" arrived in the Golden Horn from Alexandria, having left the latter port on the 21st. A declaration had been made that neither deaths nor sickness had occurred on board during the voyage, and in accordance with a quarantine regulation which exempts from detention vessels which have been five days at sea without the appearance of choleraic disease, and which carry a medical officer, she was at once admitted to free pratique. The evening of the ship's arrival, 12 sailors were sent from her into the Imperial Marine Hospital, 11 suffering from choleraic diarrhœa, and one from cholera. The case of cholera ended fatally in the course of the night. On the 30th June, seven other cases of choleraic diarrhœa and two cases of cholera were disembarked and sent into hospital. It was subsequently ascertained that diarrhœa had existed among the crew when the ship left Alexandria, and that two sailors had died from cholera, the corpses being cast overboard, while the vessel was traversing the Sea of Marmora. On the 5th July cholera broke out in the arsenal, within the precincts of which the hospital lies, first in the barracks through which the sick were carried from the frigate to the hospital, and next among the labourers in the workshops. From the 5th to the 15th July there

* Report, p. 14.

occurred in the barracks, among the workshops, and on board the ships lying off the arsenal, 71 attacks and 26 deaths. On the 9th the disease appeared in the suburb adjoining the arsenal, the earliest cases taking place among labourers living there engaged in the arsenal. Subsequently cholera appeared in and extended throughout the various quarters of the city. An instructive episode of this outbreak is related as follows :— On the 11th July a workman left the vicinity of the arsenal and visited the village of Yeni-Keni, several miles from Constantinople, on the west shore of the Bosphorus. The same evening he was seized with cholera while at a café. On the 12th July, the day following, several Mahommedan labourers and Greek boatmen who visited the same café were attacked with diarrhœa. This was the commencement of a disastrous outbreak in Yeni-Keni and the vicinity.

The appearance at Ancona, 7 July 1865.

Ancona.—The first authenticated case of cholera occurred in this port on the 7th July, but there appear to have been suspicions of the existence of the disease there before that date. The *Lombardy Medical Gazette* attributed at the time the introduction of the disease to the steam-ship "Principe di Carignano," coming from Alexandria, which as already stated, was, on the 12th June, the first to receive a foul bill of health on leaving that port. This ship arrived at Ancona on the 17th June, carrying 60 passengers, and was subjected to seven days quarantine. All ships arriving from Alexandria were afterwards placed in quarantine, for the same or a longer period of time, until the end of the outbreak in Lower Egypt. Persons detained in the lazaretto would appear to have had the privilege of sending their linen into the town to be washed, for it is to this custom, and especially to the washing of linen belonging to invalids from Alexandria then under detention, that the case of the 7th July is attributed in the Report of the International Sanitary Conference of 1866. The evidence upon this subject, however, so far as it has come under my observation, simply goes to prove that the quarantine was illusive. The mode in which cholera was introduced into Pistoia indicates the probable mode of its introduction into Ancona, and was thus stated in an official despatch of Her Majesty's Chargé d'Affairs, Florence, dated the 15th July 1865 :—"A woman who arrived from Alexandria at Ancona "on the 3rd inst. remained at the lazaretto of that place, in con- "formity with quarantine regulations, for the space of six days. She "left the lazaretto on the 9th, was taken ill on the 10th, while travel- "ling towards Pistoia, where she died on the following day with all "the known symptoms of Asiatic cholera."

This case and that of the 7th July in Ancona were the ascertained beginnings of the epidemic in Italy.

The appearance at Valencia, 8 July 1865.

Valencia.—On the 8th July a French merchant named Honoré Teissier was seized with fatal cholera immediately after his arrival at a boarding-house in the Fisherman's-Ward district (El Barrio de Pescadores). This was the first case of the epidemic in Spain. The merchant had come from Alexandria by way of Marseille, landing at Grao, the port of Valencia. Cholera had then been growing for nearly a month in Marseille, but was not officially recognised there until the 23rd July. Other inmates of the boarding-house were next attacked ; then inmates of houses in the neighbourhood. Some of the early cases were taken to the general hospital, and after their admission several patients, already under treatment in the wards, were attacked with cholera. The disease extended throughout the city, killing, from the 8th July to the close of September, 3,551 persons out of 8,800 attacked, among a population estimated at 107,000, but diminished by flight 40,000 during the prevalence of the epidemic.

Gibraltar.—I take the facts of the appearance of the epidemic here from Dr. Sutherland's report.

On the 6th July 1865 the steam transport "Orontes" left Malta (Valetta) for Gibraltar, having on board the 2nd battalion of the 22nd regiment, destined for Mauritius, together with invalids and time-expired men, besides women and children. Cholera, as stated in a previous section, had appeared among the garrison of Malta on the 20th June, and among the civil population of Valetta on the 28th. On the 10th July, after a voyage of four days, the ship arrived at Gibraltar, and the battalion was landed and marched to the usual camping ground on the North Front, outside the fortress, at a distance of 1,000 yards and upwards from the walls, the invalids, time-expired men, and some of the women and children remaining on board the "Orontes."

"With the exception of a single trifling case of diarrhœa, the regiment remained in perfect health after landing until the 18th, when a private, named Bird, presented himself to the medical officer about 9 o'clock at night, labouring under cholera, of which he died about half-past 10 the following morning. It is not known whether this man had had any previous diarrhœa, but he was at parade at 7 o'clock in the evening of the same day, or two hours before he was seized with cholera. This was the first case of the Gibraltar epidemic of 1865."

The camp was at once broken up, the head-quarters being embarked on the transport "Star of India," at anchor in the bay, and the 2nd wing moved to a new camping ground on the east side of the North Front, close to the Mediterranean, and 400 yards further away from the garrison. These movements were all completed on the 19th. The "Star of India" was detained in the bay 48 hours, when, all seeming well on board, she was allowed to go to sea. During the voyage to Mauritius five cases of diarrhœa were recorded among the soldiers, all of which recovered, but no case of cholera.

Two cases of diarrhœa occurred among the men of the 2nd wing of the 22nd after its removal to the new camping ground, but otherwise the health of the soldiers remained good until the 31st July. On this day a man named Davis, of intemperate habits, and who had been complaining for two days of indisposition, was attacked with cholera at 11 o'clock a.m., and died at 8 o'clock the same evening. The next day the wing was embarked on the transport "Davenport," and after 60 hours detention the vessel was sent to sea. Two of the men were suffering from diarrhœa at the time of embarkation, and two other men had diarrhœa during the voyage to Mauritius. All the cases recovered. The "Orontes," which had brought the battalion from Malta, sailed for England on the 14th July with 223 time-expired men, invalids, and women and children on board, and after a six days voyage she reached her destination without any new case of sickness having appeared in the ship.

On the 3rd August a corporal of the 15th regiment, occupying, with his family, a cottage under the North Front, 800 yards distant from the camp vacated by the 2nd wing of the 22nd regiment on the 31st July, was seized with cholera, together with one of his children, aged four years. The father died in 48 hours, and the child in 15 hours. A third case, which recovered, occurred in another child of this family (date not recorded).

On the 9th August a woman belonging to the Royal Engineers, inhabiting a cottage in the same locality, was attacked and died in 56 hours.

On the 10th August a soldier living in the Grand Casemates, within the fortifications of the northern extremity of the town, was seized with cholera and died in eight hours. During the afternoon and night of the

same day seven other soldiers were attacked, two of the cases being very severe, in the same barrack.

On the 10th, also, a civilian's child was suddenly seized with cholera on board a lighter in the harbour (of the Old Mole), and died there. This was the first case among the civil population.

On the 14th two cases occurred, one in a soldier inhabiting one of the cottages on the North Front, in others of which cases had taken place on the 3rd and the 9th; the other in a child of a civilian living in the south district of the Rock, on the other side of the town. On the 15th another soldier was attacked in the North Front cottages, and the next day two civilians were attacked, one at the limekiln, and the other at the slaughter-house on the North Front. The same day a child was attacked in the North Front quarters.

On the 18th another fatal case occurred in the Grand Casemates, and on the 19th the earliest cases, three in number, all fatal, took place among the civil population of the town. From this period the epidemic became general on the Rock, and continued until the 27th October, when the last case was recorded. The following is a return of the cases and deaths from cholera during the prevalence of the disease :—

—	Population	Cases.	Deaths.
Civil - - -	17,491	902	747
Military (including the families of the garrison).	5,978	163	106
Convicts - - -	850	79	54
Totals - -	24,319	1,144	637

Borchi and *Odessa.**—Borchi is a village in the district of Balta, government of Podolia, South Russia. On the $\frac{\text{O.S. 26 July}}{\text{N.S. 7 August}}$ 1865 several German families arrived there for employment on railway works in the vicinity. All appeared in excellent health when they reached Borchi, except an infant belonging to a family named Jans, which was suffering from diarrhœa. This infant died on the $\frac{29\text{ July}}{10\text{ August}}$. On the $\frac{1}{13}$th August cholera appeared among the inhabitants of the village. On the $\frac{6}{18}$th the mother of the infant Jans and two infants in other of the German families were attacked. All died, the woman on the $\frac{8}{20}$th. On the $\frac{7}{19}$th the wife of a man named Glenberg was seized with cholera. She died 12 days after in the stage of consecutive fever. On the $\frac{12}{24}$th William Exenberg was attacked; he recovered after a fortnight's illness. On the 21st the son of Glenberg was attacked and died the same day. Altogether eight of the Germans suffered from cholera, of whom one only recovered.

The appearance in South Russia. Borchi, 10 Aug. 1865.

The progress of the disease among the inhabitants of the village during the above period has not been reported. These numbered 558, and among them, before the epidemic ceased, there were 65 cases of cholera, 33 of them fatal.

On the $\frac{25\text{ August}}{6\text{ September}}$, while cholera was still prevalent in the village, a church festival took place to which came several persons from Gavinossa, a neighbouring village having a population of 444. These

* In all Russian and Rumanian references as to date, it is to be remembered that they are expressed in so-called "Old Style," dating 12 days behind the "New" Style" Calendar, which is in use in Western Europe. In the text of this report, except otherwise stated, both styles are expressed; but in the Tables given in the Appendix the "Old Style" only.

THE DIFFUSION TO EUROPE, 1865.

persons on their return home, the same day, were attacked with cholera. The disease next appeared among the other inhabitants of Gavinossa, 37 cases and 22 deaths occurring.

Afterwards other localities in the district were attacked by cholera.

The series of events here described formed the first obvious manifestation of the epidemic in Russia, and it was believed to have been started by the German families, or rather by the sick child which they had brought with them to Borchi. These families had travelled by way of Galatz and Odessa,* being at Galatz on the $\frac{23\text{ July}}{4\text{ August}}$, and at Odessa, on the $\frac{24\text{ July}}{5\text{ August}}$, reaching Borchi, as already stated, on the $\frac{26\text{ July}}{7\text{ August}}$. The first recorded cases of cholera on the Danube occurred at Sulina on the 30th July, and at Tultcha on the 4th August. The appearance of the disease in Galatz was officially recognised on the $\frac{24\text{ July}}{5\text{ August}}$, and in Odessa, on the $\frac{29\text{ July}}{10\text{ August}}$ in the lazaretto, and in the town on the $\frac{6}{18}$ August. The history of the appearance of the epidemic in the last-mentioned town is as follows :—

Odessa, 18 *August* 1865.

Odessa.—From the $\frac{29\text{ July}}{10\text{ August}}$ cases presenting all the symptoms of epidemic cholera were received into the lazaretto of this port from vessels of various kinds which arrived from Constantinople. On the $\frac{5}{17}$ August a Customs' officer, named Gouline, on duty in the quarantine harbour, became indisposed and was relieved from duty and sent to his lodgings, Slobodka Voronzow, near Moldavanka. The next day, the $\frac{6}{18}$th August, his illness was recognised to be cholera, and he was removed to the city hospital, where he died an hour after admission. Two days after the death of Gouline, his wife, son, and servant were attacked with cholera, and the last-mentioned died.

On the $\frac{22\text{ August}}{3\text{ September}}$ two labourers working in the quarantine harbour, one of them a Jew, named Dorfmann, living in Jew's Street, were attacked with cholera. At the same time the wife of the porter of the house next to that in which Dorfmann lodged fell ill from cholera. On the $\frac{23\text{ August}}{4\text{ September}}$ her husband was also attacked, and on the $\frac{24\text{ August}}{5\text{ September}}$ their daughter. Of these cases Dorfmann alone recovered.

On the $\frac{23\text{ August}}{4\text{ September}}$ Borchinsky, a labourer also employed in the quarantine harbour, was attacked on his way homewards to Ouspenski Street, and he died the following morning. The same day his son, aged two years, and his daughter, aged six months, succumbed to the disease. Two days after his widow was attacked, and she died the second day.

In Ouspenski Street and the suburb Moldavanka the majority of the cases in Odessa occurred (236 to the $\frac{14}{26}$th September, of which 109 died). Elsewhere in the city the number was insignificant.

The German families bound for Borchi were at Galatz the day preceding the official recognition of the presence of cholera in that town, and they passed thence down the Danube the day the disease

* The fact of the families passing through Odessa is not mentioned either in Dr. Arkhangelsky's recent work on cholera in European Russia (*Epidemics of Cholera in European Russia during the* 50 *years* 1823–72); by Dr. G. T. Arkhangelsky, St. Petersburg, 1874 (Kholerina Epidemiu v Europeiskoi Rossi, v 50ti. letnei period 1823–1872); or in the Report of the International Sanitary Conference of 1866 "*Sur la Marche*," &c. It is stated, however, in the report of the Conference "*Sur "les questions du programme relatives à l'Origine, à l'endémicité*, &c., *du cholera*" (p. 2), and in an official report of the outbreak, published in the "Journal de St. Petersbourg" for the 14th–26th Dec. 1865. The families no doubt passed from Galatz to Odessa along the ordinary steamboat route by the Danube.

appeared at Tultcha, and five days after its appearance at Sulina reaching Odessa five days before the acknowledged commencement of importation of disease into the lazaretto there.* From the 5th July cholera had been rapidly extending in Constantinople. Of the value of the restrictive measures established at Odessa against arrivals from Constantinople, Dr. Arkhangelsky writes, in the work previously referred to :—"The quarantined were not entirely isolated from communications with the inhabitants, and the transfer of cholera was as easy as if no quarantine existed." The same observation is equally applicable to the quarantine established at Galatz, Tultcha, and Sulina.

The appearance at Sulina, 30 July 1865.

Sulina.—On the 30th July 1865 an Ottoman steam transport arrived in the roadstead of Sulina from Constantinople, having on board a crew for one of the iron-plated gun-boats in that harbour. The transport had lost two men from cholera during the voyage. The gun-boat crew was disembarked at once, several of the men suffering from choleraic symptoms at the time, and all were quartered in an isolated building. There during that and the following day (the 31st) 12 cases of cholera and five deaths from the disease occurred. On the 2nd August a labourer was observed by Dr. Jellinck, the medical officer in charge of the Navigation Hospital, ill of cholera among a body of labourers who had come from Galatz to Sulina, and who were encamped on the opposite side of the town from the lazaretto. The same day another case was discovered, the patient being a man employed in the Lieut.-Governor's office. From this date the disease spread in the town, and for the 20 days during which it lasted, among a population of 3,000, reduced half by flight, there were 350 cases, of which 300 died.

The appearance at Kustendji, 2 August 1865.

Kustendji.—On the 2nd August a person employed on the quarantine establishment was attacked with cholera and died. This was the first case of cholera recorded here, but towards the close of July certain attacks of so-called "bilious diarrhœa" had attracted attention. On the 4th August a quarantine guard and a blacksmith, an Englishman, were attacked with cholera ; the former died, the latter recovered. On the 5th another Englishman, a clerk of the quarantine establishment, and the son of the quarantine guard who had been attacked on the 4th, were seized with cholera, and all died. The disease then became prevalent in the town, and, out of a population of 4,000, killed altogether 120 persons. There were 20 cases and 11 deaths among 84 English residents.

The passengers landed in quarantine were sent to a temporary encampment two miles from the town, where they were detained three days. During the imposition of quarantine 95 ships, 28 being steam vessels, were subjected to it, and 1,508 passengers and sailors. Eleven cases of cholera occurred on ship-board, but none among the persons detained in the quarantine establishment. The dates of the cases on ship-board have not been stated.

Early in the outbreak of cholera at Kustendji several fatal cases occurred among the Bulgarian labourers employed in the town. Many thereupon fled to the mountains, and some to Rustchuk, where the disease first appeared among these fugitives.

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* In my report for 1865, the dates of the appearance of cholera at Borchi and Odessa, and of the passage of the German families along the Lower Danube and through the last-named town, were inadvertently given according to the Old Style, under the impression that the style had been changed in the French journal (*Journal de St. Petersbourg*, 14th–26th Dec., 1865) from which I obtained the facts. The same error (corrected by M. Fauvel in his work "*Le Choléra*") occurs in the Report of the International Sanitary Conference of 1866, on the progress of the epidemic, but not in the report of the Conference on the origin, endemicity &c., of cholera, where the introduction into Borchi is also described, the dates being here expressed in New Style. It will be observed that the alteration of the style removes the obscurity which rested upon the account of the introduction of cholera, in 1865, into Russia, as given in my first report.

The appearance at Tultcha, 4 August 1865.

Tultcha.—At Tultcha the disease was first recorded among a body of sailors sent from Constantinople to man certain ships of war in the river, and who had reached Tultcha on the 2nd August. From the 4th to the 15th August there were 14 cases and 10 deaths among these men. The disease next appeared among the civil population in communication with the ships of war, and among the marine soldiery. But the introduction of the disease into Tultcha is not attributed, in the Report of the International Sanitary Conference, 1866,* to the sailors, but to a body of soldiers who had arrived in the town previous to its appearance, and who had marched across the country from Constantinople. No history is given of this detachment or of its route.

From the 10th August to the 16th September 200 deaths from cholera, it is estimated, took place in the town, of which the population is said to be 20,000.

The appearance in Saxony, 27 August 1865.

Altenburg (Saxe-Altenburg, Saxony).—On the 27th August 1865, a woman, E., sickened of cholera in Altenburg, and died on the 29th, who had reached that town from Odessa on the 24th August. She had started on the 16th August, six days after the beginning of importation of cholera into the lazaretto of that port, and two days before the disease had been officially recognized as having appeared in the town; and she had with her a child, two years old, suffering from diarrhœa at the time of starting, and which still suffered when she reached her destination in Saxony. The journey occupied nine days and nine nights. The day E. died (the 29th), and in the same house, a sister-in-law was attacked with cholera in the evening and died on the 30th. The child was now removed by a sister of the woman E. to another part of the town, where it died from exhaustion on the 31st. These cases were the beginning of the epidemic in Central Europe.†

The appearance in England.

England.—Cholera appeared at Southampton in September, and a remarkable isolated outbreak of the disease occurred at the close of the same month and beginning of October, in the parish of Theydon Bois (Epping), Essex. In June a case of cholera, undistinguishable from the epidemic affection, was admitted into Guy's Hospital, in the Metropolis, under the care of Dr. Wilks. The patient recovered. On the 27th of the same month a second case, having all the characteristics of the epidemic affection, occurred in the Metropolis and ended fatally on the 28th. The patient was a water-side labourer, living in Wilmott's Buildings, St. George's parish, Southwark. If these cases belonged to the epidemic, and it is quite possible that they may have done so, as occurring within a period when London was exposed to infection by through-route from Egypt, they remained sterile.

Southampton 17 Sept. 1865.

Southampton.—The first death from cholera, in Southampton, took place on the 24th September 1865, the case dating from the 17th of the month. There were altogether between the latter date and the 4th November, in Southampton and the vicinity, 60 cases of cholera (27 men and 33 women) of which 35 died.

Cases of cholera ending fatally occurred on two of the Peninsular and Oriental Company's vessels, the "Ellora" and "Nyanza," in their homeward voyage from Alexandria in the month of July, cholera being prevalent in that city at the time of their departure. The "Ellora" reached Southampton on the 10th July, and ran into port with diarrhœa among the crew and passengers. The "Nyanza" arrived on the 22nd July, having lost a passenger from cholera five days before her arrival.

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* Rapport sur la Marche, &c., p. 25.

† See concerning the cases in Altenburg, Dr. Rudolf Gunther's work, "*Die indische Cholera in Sachsen im Jahre*, 1865," (Leipzig), pp. 9–11.

The officers and crew of this ship had suffered more or less from diarrhœa.

Diarrhœa broke out among the crew of another of the Peninsular and Oriental Company's ships, the "Delta," while lying at Alexandria in August. The day the "Delta" sailed on her homeward voyage, the 28th August, a passenger was received on board suffering from diarrhœa, and he remained on the sick-list until the 10th September, the day before the vessel reached Southampton. Some of the crew were so ill from diarrhœa towards the termination of the voyage as to be off duty from the 7th September to the 10th.

These facts must not be taken as representing the whole amount of diarrhœal affection, among the passengers and crews of the Peninsular and Oriental Company's ships, running between Alexandria and Southampton, from the time of the appearance of cholera in the former place to the appearance of the disease in the latter. They simply represent the facts recovered on this subject some time after the manifestation of cholera in Southampton, when it was impossible to obtain the history of every ship with such precision as was desirable. The facts, indeed, indicate what may have happened in a greater or less degree in every ship that came into Southampton from Alexandria at this period, for so imperfect were the means of eliciting information at the time of the arrival of vessels, that the "Ellora" ran into Southampton with cases of diarrhœa on board, and after having lost cases from cholera, without the facts becoming known, even to the quarantine officers, until months afterwards.

Professor Parkes, F.R.S., made the outbreak at Southampton a subject of elaborate inquiry, under instructions from the Privy Council. He ascertained that the persons earliest attacked were, from the nature of their occupation, more exposed to chances of contagion introduced into the town and vicinity from the port than the rest of the community, although none had had communication direct or indirect with the Peninsular and Oriental Company's vessels.*

Theydon Bois, Essex (a parish in the Ongar hundred, containing, in 1861, 165 inhabited houses, and a population of 610 souls).—There occurred here, in an isolated farmhouse, and in direct or indirect connection therewith, at the close of September and beginning of October 1865, 12 cases of cholera, of which nine died. On the 25th September the head of the house and his wife returned home from Weymouth, where they had been staying several days, one or both suffering from diarrhœa. They had travelled to London by express train, passing through Southampton West on the journey, but not stopping there, so far as could be ascertained, except during the ordinary halt of the train at the station.† From the 28th September to the 6th October, inclusive, eight members of the family, including the head of the house, his wife, a maid-servant, and servant boy, were attacked with cholera. Of these persons five died, one, a child aged eight years, after less than 12 hours illness, and three during the stage of

Theydon Bois, 28 *Sept.* 1865.

* See *Eighth Report of the Medical Officer of the Privy Council*:—"On the Outbreak of Cholera in and about Southampton in September and October 1865," p. 392.

† This statement must be taken with some qualification. Both the farmer and his wife, who alone could have given precise information on the subject, were dead when I investigated this outbreak for the Privy Council. I have since had reason to believe that the wife may have visited one of the waterclosets at the station during the halt of the train, assuming no longer delay there. (See on this outbreak the "*Eighth Report of the Medical Officer of the Privy Council*;" also, "*Transactions of the Epidemiol gical Society of London*," vol. 3, p. 85.)

consecutive fever. Within the same period the family medical attendant and a labourer employed about the house were both seized and both died, the former after 10 hours' illness. On the 10th October a woman who had assisted in laying out the corpse of the labourer was attacked and died the next day. Finally, a grandchild of this woman was seized with choleraic symptoms on the 31st October, and died in 36 hours.

All the cases but three (those of the medical attendant, the woman last mentioned, and her grandchild,) appeared to have been determined by the use of water from a well polluted by leakage from a sink-drain and from the soil-pipe of a watercloset into which had been cast, first, the diarrhœal discharges of the head of the house and his wife, and subsequently the "rice-water" evacuations of the first two patients seized with cholera.

General considerations from the different appearances of cholera described.

The different appearances of cholera which I have thus attempted to describe were the beginnings of the epidemic in Europe. I have dealt with them separately because they enable us to study with much clearness the manner of progress of the disease, and give the clue to its dissemination when it enters upon the great thoroughfares of the Continent, and within the active life and rapidly interchanging movements of the different populations, when it becomes impossible to follow the diffusion in detail. It is to be observed—

1. That the epidemic invaded Europe at spots, and at such spots only, as were in the most frequent and directest communication with Alexandria.
2. That in no instance did the invasion of the disease occur before there had been abundant opportunity for infection of the population invaded, assuming the disease to be infectious.
3. That in several instances, *e.g.*, at Constantinople, Pistoia, Valencia, Altenburg, the introduction of the disease and subsequent spread in direct relation to the case or cases introduced was obvious.
4. That in other places, *e.g.*, Marseille, Borchi, Malta, Ancona, Southampton, the inference of introduction of the disease, as the starting point of prevalence, is, from the preceding and concurring events, as certain as if the different steps had been as clearly observed as in the places previously mentioned.
5. That these conclusions apply equally to the places secondarily invaded, as Kustendji, the Danubian ports, and Odessa from Constantinople; Gibraltar from Malta; and Theydon Bois from Southampton.
6. That the facts recorded of Marseille and of Malta would appear to indicate that there is a period of the disease, as it is about to become prevalent or is becoming prevalent in a locality, when it is peculiarly transmissible, or is liable to be transmitted unrecognised. The transmission to Malta and Marseille took place almost certainly before the existence of cholera in Alexandria had become officially recognized. Some of the apparent mystery of the mode of transmission in these instances no doubt depends upon imperfect observation. But the transmission to Southampton, and through Southampton to Theydon Bois, shows how much we have yet to learn of the obscurer modes of transmission of the disease, or in other words, of its slighter, perhaps unrecognized, and not fatal forms. The introduction to Borchi forms in some sort a parallel to that of Theydon Bois, the introducers in both cases having passed rapidly through a district in which cholera was about to become

prevalent. Other instances of the same class are recorded in this report.

7. The conclusions here arrived at or suggested from the phenomena of the invasion of Europe are the same as those derived from the phenomena of the invasion of Egypt. Similar conclusions follow from the invasions I have still to describe, each separate invasion adding to the force of the conclusions derived from other invasions.

I now proceed to a description of the progress of the epidemic on the Continent in 1865 and the four subsequent years. Here I make no pretension to completeness, and the details I have to give must be regarded simply as materials towards the compilation of a complete history.

§

Diffusion in Europe, 1865.

1865.—From and through the several points of invasion which have been described, cholera penetrated into and became diffused in several parts of Eastern, Southern, and Central Europe, and into one part of Western Europe in 1865. It spread into southern, central, and northern Turkey in Europe, and along the valley of the Danube as high as the Hungarian frontier. It extended up the valley of the Sereth and the Pruth, and became widely diffused there, and in other districts of Wallachia and Moldavia. Contemporaneously with this diffusion it spread over Bessarabia and South Russia from the Wallachian border to the Don, sending hence, as already stated, a forerunner into Central Europe, at Altenburg, in Saxony.

While this diffusion was in progress in Eastern Europe and had begun in Central Europe, in Southern Europe cholera, beginning first at Ancona, had spread over the Adriatic provinces of Italy, and extended into several of its northern and western provinces. In Western Europe, moreover, the disease had become widely diffused in France, attacking especially the Mediterranean Departments of Bôuches-du-Rhone, Herault, and Var, and the metropolitan department of the Seine. In Spain also the Mediterranean provinces (including the insular dependency of Majorca) were especially affected, the disease also spreading into several of the southern and central provinces. In England there was no further diffusion than that already noted at Southampton and Theydon Bois. (*See* Map II.)

Of the diffusion on the Continent which I have thus summarily described the following are the most important details in my possession.

Turkey in Europe.

Turkey in Europe.—Very little is known of the diffusion of cholera in Turkey in Europe during 1865, beyond the scattering of the disease along the coast of this part of the Empire. South of Constantinople, Enos, the districts adjoining Cavalla, Salonica, Volo, and Larissa were affected; north of Constantinople, Kustendji; and on the Danube, Rustchuk, Tultcha, and Widin. In the interior, Phillipopolis, Pasardjik, Seres, and Filurina are reported to have suffered. With the exception of Constantinople, and the different quarantine stations of the Empire, the details of the movements of cholera in the various localities infected are very meagre. In Constantinople, from the 28th June to the close of September, the disease caused from 12,000 to 15,000 deaths in a population estimated at 900,000. At Therapeia, on the Bosphorus, there were from 130 to 140 deaths. At Enos, there were 56 cases of cholera, of which 52 died, in a population of 2,500,

from the 17th August to the 25th September. At Salonika, only three deaths from cholera were reported, but "many villages" were infected lying between Salonika and Cavalla on the coast, and Seres in the interior. The villages first infected near Salonika were those through which persons in quarantine were taken to the lazaretto, and where they halted. From these villages, some of which, and especially Galatzita, suffered very severely, the disease spread into the interior. In Volo, one case of cholera is stated to have happened, but 32 deaths from the disease were reported from neighbouring villages. In Larissa, there were 18 cases, and seven deaths reported from 5th to the 15th December inclusive. At Kustendji, cholera caused 120 deaths in August and September, 11 among the English residents. On the Danube, in the Bulgarian towns, the disease appears to have been more fatal. In Rustchuk, 360 cases and 131 deaths were reported in the 16 days following the 23rd August, among a population of 22,000; in Tultcha, 200 deaths from the 4th August to the 16th September, among a population of 20,000; at Widin, 300 cases and 110 deaths among a population of 25,000. Of the losses occasioned by cholera in the interior nothing has been made known, except with regard to Filurina, where from the 27th October to the 8th November there were 61 cases and 19 deaths, among a population of 7,000.

How far these meagre and imperfect data indicate the extent of prevalence of cholera in Turkey in Europe I am unable to state. At the time of prevalence of the disease, Her Majesty's representatives in the northern districts believed, that it was as prevalent on the Bulgarian as on the Rumanian side of the Danube. If this were the case, the facts stated, as will subsequently be seen, help very little to a just estimate of the extent to which cholera prevailed in Bulgaria.

Although the data relating to the diffusion of the disease on the mainland are very imperfect, those referring to its occurrence in the different quarantine stations in the empire are fairly complete, and are of much interest. I have summarised the more important of these in the accompanying Table, including the stations of Turkey in Asia with those of Turkey in Europe (see p. 59).

Rumania, 1865.

Rumania.—According to official reports, cholera appeared in this State, in 1865, on the Danube, first at Brahilov, on the $\frac{19\text{th}}{31\text{st}}$ July, and next, at Galatz, on the $\frac{24\text{th July}}{5\text{th August.}}$ It extended to the 33 towns and districts, and in several of these (Bukharest, Bottishani, and Jassy) it was still prevalent at the close of the year. The dates of appearance of the disease in the more important places attacked after Brahilov and Galatz were as follows:—Reni, $\frac{29\text{th July}}{10\text{th August}}$; Ismail, $\frac{1\text{st}}{13\text{th}}$ August; Bolgrad, $\frac{2\text{nd}}{14\text{th}}$ August; Bakeu, district, $\frac{18\text{th}}{30\text{th}}$ August, town, $\frac{24\text{th August}}{5\text{th September}}$; Byrlat, $\frac{27\text{th August}}{8\text{th September}}$; Bukharest, $\frac{5\text{th}}{17\text{th}}$ October; Jassy, $\frac{10\text{th}}{22\text{nd}}$ November. The greater number of the places to which the disease extended were in Moldavia and in Eastern Wallachia. Within the period named ($\frac{19\text{th}}{31\text{st}}$ July to $\frac{31\text{st December 1865}}{12\text{th January 1866}}$) 9,917 [? 10,057] seizures and 4,782 [? 3,930] deaths from cholera were registered. (See *Appendix*, Table II.)

Russia in Europe, 1865

Russia in Europe.—Very little was known of the different epidemics of cholera from which Russia has suffered, until the publication, last year (1874), of a treatise on the subject by Dr. Arkhangelsky, of

TABLE showing the OCCURRENCES of CHOLERA in the principal QUARANTINE STATIONS of TURKEY, 1865.*

Quarantine Station.	No. of Ships in Quarantine.	No. of Crews.	No. of Persons detained in Lazaretto.	Duration of Quarantine.	Greatest No. under detention at one time.	Cases of Cholera occurring on Ships in Quarantine.	Cases of Cholera occurring in the Lazaretto.	Deaths from Cholera in the Lazaretto.	Nature and Position of Lazaretto.	Cholera in Town or District adjacent to Lazaretto, and Remarks.
Sulina - -	887	7,983	518	5–10 days	73	30	12	5	Two buildings, containing together 8 rooms, and some huts outside the town.	Upwards of 300 deaths in the town.
Kustendji -	95	928	580	3 days	—	11	—	—	Tents two miles from town.	140 cases in town, including several persons of quarantine service.
Bourgas -	186	1,718	1,096	3 days	—	3	—	—	Huts - - - - - -	Two quarantine guards.
Enos - -	75	579	63	—	—	—	—	—	- - - - - - - -	15 deaths in the town.
Cavalla - -	28	635	396	—	—	5	Many cases cholerine.	—	"Un vaste local" one hour from town; hospital on an islet.	Town exempt.
Salonika -	78	—	4,257	5–20 days	1,300	—	265	122	1, One hour distant from town. 2, Temporary huts 3 hours distant.	Town 3 cases. Propagated to villages traversed by the detained in going to the lazaretto, and where they halted; and thence to neighbourhood of Seres.
Volo - -	25	526	2,265	—	—	5	57	23	Tents on island in gulf - - -	1 case from infected village in interior. 9 cases, 4 deaths, lazaret service.
Mytilene -	305	1,420	2,655	—	—	—	2	—	- - - - - - - -	Island exempt.
Rhodes - -	288	2,501	2,618	10 days	—	—	1	1	Partly temporary encampment of tents.	Do.
Crete - -	103	843	972	10 days	—	11	13	9	Temporary encampments on islands in gulf of Sudha.	Island exempt. One fatal case among lazaret service.
Valona - -	22	—	416	10 days	—	5	—	2	Island, tents.	Town free.
Gallipoli -	80	472	109	—	—	—	—	—	- - - - - - - -	—
Dardanelles -	145	3,058	2,269	5–10 days	900	16	6	15	Permanent, adjacent to town.	339 deaths in the town. Earliest cases persons belonging to quarantine service or in communication with lazaretto.
Smyrna - -	—	—	1,701	—	—	14	4	10	- - - - - - - -	Upwards of 2,000 deaths in the town.
Cyprus (Larnaca).	42	573	1,199	—	—	4	22	7	Permanent stone building adjoining town.	363 deaths in town.
Mersina -	97	1,953	450	—	—	—	—	—	Well isolated although wretched -	Severe outbreak. First case from Adana where disease prevalent.
Beyront -	50	950	3,600	—	—	18 (in passage from Alexandria).	30	15	Lazaretto supplemented by houses, and a hotel. No proper séparation of sick and healthy.	1,500 cases, 493 deaths in town.
Samsoun -	56	1,960	3,170	5–10 days	307	18	6	12 (24 bodies landed from ships).	Commodious barracks with hospital, at a distance from town.	—
Trebizond -	68	2,558	5,073	—	600	1 (several fatal during voyage).	—	39	Partly under tents - - -	45 cases, 28 deaths in town.

* From data given in the Proceedings of the International Sanitary Conference, 1866 (*Rapport sur la Marche*, &c.).

St. Petersburg, to which reference has already been made (p. 52 *footnote*). This very important work, based upon official information in the possession of the Medical Department of the Russian Government, supplies a great want in epidemiological literature, and from it I shall take the data necessary to show the progress of cholera in Russia during the periods I shall have to consider.

The first appearance of cholera in South Russia, at Borchi, in the government Podolia, on the $\frac{\text{26th July}}{\text{7th August}}$ 1865, I have already described. Its next appearance was in the government of Kherson, at Odessa, on the $\frac{\text{29th July}}{\text{10th August}}$, and, according to Dr. Arkhangelsky, at Nicolaiev the same day. The disease then spread into neighbouring governments, appearing in Volhynia, August $\frac{\text{11th}}{\text{23rd}}$; Kertch-Yenikale (Taurida), August $\frac{\text{17th}}{\text{29th}}$; Kiev, $\frac{\text{September 25th}}{\text{October 7th}}$; Bessarabia, October $\frac{\text{1st}}{\text{13th}}$; Ekaterinoslav-with-Taganrog, October $\frac{\text{16th}}{\text{28th}}$; the Don, $\frac{\text{October 24th}}{\text{November 5th}}$; Voronej, November $\frac{\text{13th}}{\text{25th}}$; and Kharkov, November $\frac{\text{15th}}{\text{27th}}$. With the exception seemingly of Kertch-Yenikale, from which there is no record after $\frac{\text{27th October}}{\text{8th November}}$ and of Bessarabia and Voronej, where the disease intermitted in December, the epidemic continued into the next year, terminating for the time being in the goverments of the Don, of Podolia, and of Kherson (with Odessa), in January 1866; in the governments of Ekaterinoslav-with-Taganrog and of Kiev, in February; and of Kursk, and Kharkov, in April. During this first period of the epidemic, and its diffusion in eleven governments of South Russia, 13,315 persons were attacked, of whom 4,177 died. (See *Appendix*, Table VI.)

Italy, 1865.

Italy.—Beginning in the province of Ancona on the 7th July (See p. 49), cholera in 1865 extended to 34 of the 65 provinces into which Italy was then divided, and in these provinces it appeared in 349 townships and communes. It extended also to parts of the Papal Territory. The provinces chiefly affected were: Ancona, Capitanata, Napoli, Terra di Bari, and Terra d'Otranto (See *Appendix*, Table XX.). The following is a summary statement of the sickness and mortality caused by this diffusion furnished to the Registrar-General,* by Dr. P. Maestri, of the Italian Ministry of Agriculture, Industry, and Commerce:—

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* *Weekly Returns of Registrar-General*, 1866, p. 883:—Dr. Maestri precedes this table, and other statistical tables relating to the epidemic, given in the volume of Weekly Returns referred to, by a statement (the statement of the official report referred to below) that the epidemic began on the 25th June 1865, in the Province of Turin. This statement refers to a fatal case of cholera ("colera spontaneo, isolato") which occurred in Turin on that date. Another fatal case occured in the same city on the 7th July. These cases were considered at the time as instances of *cholera nostras*, and it was not until the 14th August that the first case of malignant cholera (an importation from Marseille) was observed. The number of deaths registered from cholera in Turin during the seven months, June–December 1865, was as follows:—June, 1; July, 1; August, 3; September, 0; October, 1; November, 9; December, 71. Total 86. (*Istoria Documentata delle Epidemie di Colera di Torino*, 1865 *e* 1866. *del Prof. Giuseppe Teresio Rizzetti.* The details relating to the prevalence of cholera in Italy in 1865, 1866, and 1867, I have chiefly taken from the two official statistical reports on the subject (*Statistica de Reyno d'Italia. Sanità Publica. Il Colera Morbus nel* 1865., Firenze, 1867; and, with the same prefix, "*Il Colera Morbus nel* 1866 *e* 1867," Firenze, 1870). In the first of these reports the outbreak commencing in 1865 is described as ending on the 10th March 1866. In the second report the prevalence of 1866 is described as beginning on the 12th January. In reality the epidemic in the kingdom was continuous from its beginning in 1865 to its end in 1867.

Italy, 1865.

Sex.	Population of Communes attacked.	Attacks.		Deaths.		
		Total.	Per 10,000 Inhabitants.	Total.	Per 10,000 Inhabitants.	Per 100 Attacks.
Males - -	1,867,419	12,143	65·0	6,707	36·3	55·7
Females - -	1,810,528	11,434	63·1	6,134	33·9	53·6
Total - -	3,677,947	23,577	64·1	12,901	35·1	54·7
	[?3,823,751]*			[?12,887]*		

Austria.—The epidemic was first observed in this empire at Prosecco, a village near Trieste, on the 29th September 1865. Shortly afterwards (prior to the 5th October) nine cases, of which six were fatal, occurred in the city and suburbs of Trieste. Altogether 83 cases and 60 deaths were recorded in that port before the close of the year. The disease does not appear to have spread beyond Trieste and the immediate vicinity. *Austria*, 1865.

France.—Following upon the appearance of the disease in Marseille, in June 1865, cholera in the course of the next six months invaded 36 of the 85 departments of France. Paris was attacked, first in the suburban village of Puteaux, on the 18th September, and at the close of the year the epidemic had caused 6,441 deaths. In the greater number of the departments affected only scattered cases occurred, the stress of the epidemic falling upon Bouches-du-Rhône, Var, Herault, and Seine. The distribution of the disease in France, and approximative mortality from it,† are shown in the accompanying summary of a return published under the authority of the Minister for Agriculture, Commerce, and Public Works :—

Department.	No. of Communes attacked.	No. of Deaths from Cholera declared.	Date of Invasion of the Epidemic.
Bouches du Rhône -	17	2,196	17th July.
Vaucluse - -	22	71	5th August.
Var - - -	15	1,691	26th ,,
Herault - -	35	407	31st ,,
Savoie - -	1	3	6th September.
Pyrénées-Orientales -	1	32	,, ,,
Rhône - -	1	10	11th ,,
Seine - - -	Paris and rural communes.	6,383	22nd ,,
Yonne - -	1	1	1st October.
Vienne (Haute) -	1	5	,, ,,
Somme - -	4	16	1st ,,
Oise - - -	6	36	5th ,,
Nord - - -	2	33	6th ,,
Moselle - -	2	15	,, ,,
Eure-et-Loir - -	2	2	8th ,,
Seine-et-Marne -	10	44	9th ,,
Ariége - -	1	6	10th ,,
Allier - -	1	5	12th ,,

* The totals of several of the official returns given in the Appendix do not always represent accurately the sum of the columns of figures to which they are attached. Where necessary, I shall add the corrected total, with a mark of interrogation, in brackets.

† The return is given in detail in M. Jules Girette's interesting work, *La Civilization et le Choléra* ; Paris, 1867, p. 291.

Department.	No. of Communes attacked.	No. of Deaths from Cholera declared.	Date of Invasion of the Epidemic.
Finistère - -	9	95	15th October.
Pas-de-Calais - -	1	4	12th ,,
Seine-et-Oise -	26	220	14th ,,
Saône-et-Loire -	2	5	14th ,,
Deux-Sevres - -	1	5	15th ,,
Seine-Inférieure -	4	37	18th ,,
Gard - - -	1	6	29th ,,
Meurthe - -	3	4	3rd November.
Loire-et-Cher -	2	10	4th ,,
Vosges - -	2	44	28th ,,
Nièvre - -	1	4	25th ,,
Orne - - -	1	10	30th ,,
Calvados - -	1	38	1st December.
Loiret - -	1	3	5th ,,
Ille-et-Vilaine -	1	2	8th ,,
Manche - -	6	132	13th ,,
Morbihan - -	1	6	17th ,,
Loire Inférieure -	1	3	26th ,,
Total - -		10,584	

Spain, 1865.

Spain.—No official account appears to have been published of the progress of the epidemic in Spain. The following information relating to the disease there is obtained partly from the account prepared by Dr. Webster, F.R.S., from the Spanish medical journals at the time, and given in my first report, and partly from the facts communicated to the International Sanitary Conference of 1866, by the Spanish delegates.

From the commencement of the epidemic in Valencia the 8th July (*See* p. 39) to the 10th November, the disease had prevailed in 486 localities (towns, villages, and their vicinity), distributed in 22 provinces. In the province of Albacete, 23 localities; Alicante, 27; Badajoz, 91; Balearic Islands, 10; Barcelona, 7; Cadiz, 1; Castellan, 37; Ciudad Real, 5; Girona, 2; Guadalajara, 9; Huelva, 1; Jaen, 2; Madrid, 26; Murcia, 21; Segovia, 8; Sevilla, 20; Tarragona, 15; Teruel, 34; Toledo, 4; Valencia, 197; Valladolid, 1; and Zaragoza, 27. Subsequently 9 other provinces appear to have suffered from the disease, making a total of 31 invaded by the epidemic, out of the 49 into which the kingdom is divided.

In the town of Valencia, it is estimated, that from the date of introduction of the disease to the 22nd October, when it ceased, 5,100 deaths occurred among a population numbering, at the commencement of the epidemic, 107,000, but reduced by flight, during its progress, to 67,000. In the town of Carthagena (population 25,000) the deaths were 900; in the town of Murcia (population 37,000) 879. In both these towns the population was reduced probably one half, during the course of the epidemic, by the flight of the inhabitants. Cholera appeared in Seville on the 6th September, and prevailed there until the 30th November. Within that period there were 4,330 cases and 2,674 deaths, among a population estimated at from 130,000 to 140,000, but reduced 25,000, also from the flight of inhabitants, when the epidemic appeared. Barcelona (population 190,298) was attacked on the 22nd July, and 1,799 deaths from cholera were recorded from that date to the 15th November, when the disease ceased. It is stated that no less than half the population fled from the town at the commencement of the epidemic. In Madrid (population, in 1864, 475,785), from the earliest observed case on the 15th August to the 20th November, there were 2,869 deaths.

In Alicante (population, 21,000), the mortality was 517. Palma suffered a mortality of 2,892, among a population estimated at 50,000, but diminished one fifth by flight. These disconnected facts will indicate in some measure the extent of prevalence and the degree of severity of the epidemic in Spain.

Portugal.—This kingdom suffered only from a slight scattering of cholera across the Spanish frontier. The disease appeared at Elvas (Alantajo) on the 1st October, and caused there about 50 deaths. An infected person, going from Elvas to Oporto, sickened in the last-named town and infected three other individuals in the same house. Another outbreak occurred at Freixo d' Espada a Cinta (Tras-os-Montes), but it is stated to have caused only a few deaths. There do not appear to have been any other occurrences of cholera in Portugal in 1865.

Portugal, 1865.

Central Europe—Saxony.—After the appearance of cholera at Altenburg, Saxe-Altenburg, on the 27th August 1865, as already related (*See* p. 54), the disease extended to neighbouring districts of Saxony, and from that date to the 29th December it caused 468 deaths. Twenty-five localities were affected, but in 15 of these one death only occurred from cholera in each locality; in two, 2 deaths in each; and in two also (Crossen and Marienthal) 5 deaths in each.* The loss of life from the disease and its duration in the remaining localities are shown in the following table:—

Saxony, 1865.

Place.	Population, 1864.	Duration of Epidemic.	Deaths from cholera.
Altenburg - -	17,966	27th Aug.–15th Dec. - -	92
Werdau - -	10,548	30th Sept.–11th Dec. - -	261
Rasephas - -	246	14th Sept.–14th Oct. - -	12
Zwickau - -	22,432	15th Nov.–12th Dec. - -	14
Glauchau - -	19,296	28th Nov.–25th Dec. - -	32
Elsterberg - -	3,557	26th Nov.–14th Dec. - -	28

The British Islands.—The appearance of the epidemic in the British Islands was limited in 1865 to the outbreaks at Southampton and its vicinity, and Theydon Bois, which have been already described (*See* pp. 54–56).

The British Islands, 1865.

1866.—At the close of 1865 cholera had become quiescent in the greater number of places in which it had appeared in Europe, but in a few it still remained more or less active, as in certain districts of South Russia; and this activity was continued into the next year. As 1866 advanced, the epidemic reappeared in many districts and invaded others, and before the close of the year it had extended over the greater portion of Central and Northern Europe. In Turkey cholera reappeared at Constantinople and caused a few deaths there late in the year. It attacked Salonika, which town had escaped the previous year, again showed itself in several districts of Bulgaria along the Danube, and then, passing westwards, entered Bosna-Serai. In Rumania the disease became prevalent in the majority of the localities which had suffered from it in 1865, and it extended to others. The total number of localities affected by the epidemic in this country in 1866 numbered less than in

Diffusion in Europe, 1866.

* *Die indische Cholera in Sachsen*, 1865. Dr. Rudolf Günther, Leipzig, pp. 84, 85.

1865, but the sickness and mortality from it were very considerably greater. In Russia the disease spread over the whole country, with the exception of Finland and the province of Archangel. In Italy cholera was more widely diffused than in 1865. In Austria and Hungary the epidemic became general. In France it was probably as widely disseminated as in 1865. In that year 36 departments had been affected by it; in 1866 the unofficial and incomplete records which exist on the subject show that 35 were affected. Of these 35 departments, 15 were newly invaded in the course of the year. In Saxony the epidemic extended throughout the kingdom. In the British Islands it was widely diffused. Of Spain I have no information.

Such briefly was the course and general distribution of the epidemic this year in the countries of the Continent which had been invaded in 1865. In addition, the epidemic spread in 1866 over Belgium and the Netherlands, Prussia, Poland, and Sweden, attacked Norway slightly at a few points, and touched, still more slightly, Denmark. (*See* Map III.).

The loss of life from this year's diffusion in Europe, as the account of its distribution, is only imperfectly known. The following is a summary of the mortality in those countries of which some definite information on the subject has come to my knowledge. Other information on the same subject, relating to particular localities, is given in the subsequent accounts of the diffusion in the different countries which have been referred to:—

Country.	Population.	Deaths from cholera.
Rumania - - -	3,864,848 (1860)	26,179
Russia in Europe - - -	59,330,752 (1858)	72,586
Poland - - - -	4,840,466 (1860)	17,799
Austria (part of) - - -	3,642,311*	96,879
Prussia - - - -	19,304,843 (1864)	114,683
Italy - - - -	21,776,953 (1862)	19,571
Belgium - - - -	4,940,570 (1864)	32,812
Netherlands - - -	3,735,682 (1865)	19,686
Saxony - - - -	2,343,994 (1864)	6,736
Sweden - - - -	4,114,141 (1865)	4,503
Norway - - - -	1,701,478 (1866)	51
Great Britain and Ireland -	27,927,485 (1861)	17,149
		428,634

* So stated in the official return of cholera used in this Report.

Turkey in Europe, 1866

Turkey in Europe.—Turkey appears to have suffered little from cholera in 1866. It reappeared in July at Tultcha and Rustchuk, on the Danube. At the latter town the disease was chiefly prevalent among troops encamped in the vicinity. Many of the villages in the district surrounding Rustchuk were attacked. Later in the year the disease appears to have been prevalent to some extent at Shumla, and in the neighbourhood of that town and military station. Subsequently it was reported to be prevalent in Belgrade, but nothing definite has been made known of the extent of its prevalence there and in Servia generally. In September cholera appeared in Bosna-Serai (Seraijevo), and spread to an unknown extent in Bosnia. Maglai and Sienitza were infected, and in Seraijevo there were 600 deaths reported from the 12th September to the 31st October, the disease ceasing there at the latter date. In October cholera reappeared in the suburbs of Constantinople at the

village of Ortikaioi. Here from the 9th October to the 20th November 14 cases and 12 deaths from cholera occurred, and 40 cases of diarrhœa. In November several cases, none fatal, happened on board ships moored off Ortikaioi and Beshiktash; and nine cases and eight deaths were reported scattered over the northern portion of the city, north of the Golden Horn. In November, also, the disease broke out in Salonika, and from that date to the 8th December, 70 cases and 31 deaths occurred there.

Rumania.—Cholera, in 1866, prevailed in 45 localities in Rumania as compared with 33 in 1865. Twenty-two of the localities in which the disease became prevalent in 1866 were newly attacked that year, namely, the towns and districts of Dimbovitza, Nemtu, Roman, Suceva, Rymnik-Valtchei, and Vasluiu, the districts of Faltchei, Golia, Ismail, Tecuciu, Tutova, Arges, and Teleorman, and the town of Caracal. The 23 localities in which the disease had prevailed in 1865, and in which it reappeared in 1866, were the towns and districts of Bakeu, Braila, Jassy, Cahul and Rymnik-Saratu, the districts of Bolgrad, Botosani, Buseo, Covarluiu, Ilfov, Ismail, and Dolgiu, and the towns of Galatz, Ismail, Ploesci, Byrlat, and Giurgevo. The greater number of the localities affected in 1866, as in 1865, are situated in Moldavia, in the valleys of the Pruth and Seres rivers, and in Eastern Wallachia within the district bordering the Danube. In Western Wallachia the disease extended up the valley of the Aluta as high as Rymnik-Valtchei.

Rumania, 1866.

The prevalence of cholera in Rumania, in 1866, began in the district of Jassy on the $\frac{4th}{16th}$ May, and ended in the town of Caracal on the $\frac{10th}{22nd}$ October. Within this period there were 65,541 [? 64,853] seizures and 26,174 [? 29,020] deaths, the seizures in 1865 having numbered 9,917 [? 10,057] and the deaths 4,782 [? 3,930]. (See *Appendix*, Table III.).

Russia in Europe.—Cholera was still more or less prevalent in eight of the twelve governments of South Russia invaded by the disease in 1865, when that year came to a close.

Russia in Europe, 1866.

The following are the dates (New Style), of the cessation of the outbreak of 1865 in those provinces in which it continued until 1866, and of the reappearance of the disease in the same governments that year :—

Government.	Date of cessation of Outbreak of 1865. (New Style.)	Date of reappearance of Cholera in 1866. (New Style.)
Don Cossacks - -	20th January 1866 -	July 26th, 1866.
Podolia - - -	2nd February ,, -	June 11th ,,
Kherson - - -	12th ,, ,, -	June 26th ,,
Ekaterinoslav-with-Taganrog	27th ,, ,, -	June 13th ,,
Kiev - - -	1st March ,, -	March 27th ,,
Kharkov - - -	3rd ,, ,, -	July 5th ,,
Kursk - - -	11th ,, ,, -	June — ,,
Volhynia - - -	Continued into and through 1866.	——

The re-awakening activity of the epidemic in Russia was first observed, in March, in the government of Kiev, cholera having continued throughout the winter in the adjoining province of Volhynia. In the next month, April, the disease became again active in Bessarabia. This government, as that of Kiev, had suffered from the epidemic the

preceding year, but the disease had ceased there on the $\frac{5\text{th}}{17\text{th}}$ December In May the disease appeared beyond the area of the diffusion of 1865, in the government of Minsk, the first case being recorded there on the $\frac{6\text{th}}{18\text{th}}$ of the month. On the $\frac{30\text{th May}}{11\text{th June}}$ cholera reappeared in Podolia. About the same time the disease reappeared in the government of Ekaterinoslav-with-Taganrog, and extended into new ground in the government of Poltava. Next in order of succession of the epidemic's appearance came the government of Grodno, where the disease began on the $\frac{11\text{th}}{23\text{rd}}$ June.

The provinces here mentioned form a group which hem in Volhynia, and which have direct relations with that province or with each other. Volhynia, in fact, formed the centre of the early diffusion of cholera in this part of Europe in 1866. For in Galicia, in the Bukovina, the epidemic appeared at the beginning of May (on the 4th), here commencing its course in Austria; and in Moldavia it reappeared in the district of Jassy on the $\frac{4}{16}$th of the same month. Of the movement of the epidemic on the Polish frontier of Volhynia I have no information. Dr. Arkhangelsky does not include in his work the cholera statistics for 1866 in Poland, but from the severity of the epidemic in this division of the Russian Empire during that year, it may perhaps reasonably be inferred that the progress of the disease in the government of Lublin was no exception to that observed in other adjacent governments and countries.

On the $\frac{14\text{th}}{26\text{th}}$ June cholera appeared in St. Petersburg, and the same day it reappeared in the Governments of Kherson and the Don Cossacks. The next day, the $\frac{15\text{th}}{27\text{th}}$, the disease re-appeared in Taurida, and the day following, the $\frac{16\text{th}}{28\text{th}}$, it showed itself in another government previously free from the epidemic, Moscow. From the dates of invasion of the governments of St. Petersburg and Moscow the relation of the successive outbreaks to the original centre of diffusion in the south-western provinces is no longer apparent in the tabulated records. After the $\frac{16\text{th}}{28\text{th}}$ June the epidemic became manifest in the several governments still unaffected in the months following and in the order stated. In *July*, Tchernigov ($\frac{25\text{th June}}{7\text{th July}}$), Tver ($\frac{26\text{th June}}{8\text{th July}}$), Olonetz ($\frac{29\text{th June}}{11\text{th July}}$), Orel and Kursk (dates not given), Jaroslav ($\frac{1\text{st July}}{13\text{th July}}$), Esthonia ($\frac{3\text{rd}}{15\text{th}}$), Kasan ($\frac{3\text{rd}}{15\text{th}}$), Vologda ($\frac{5\text{th}}{17\text{th}}$), Livonia ($\frac{7\text{th}}{19\text{th}}$), Tambov, Kaluga, and Vilna ($\frac{8\text{th}}{20\text{th}}$), Pskov and Voronej ($\frac{13\text{th}}{25\text{th}}$), Vitebsk ($\frac{15\text{th}}{27\text{th}}$), Saratov ($\frac{16\text{th}}{28\text{th}}$), Tula ($\frac{19\text{th}}{31\text{st}}$). In *August*, Kovno ($\frac{21\text{st July}}{2\text{nd August}}$), Nijni-gorod ($\frac{22\text{nd July}}{3\text{rd August}}$), Courland ($\frac{23\text{rd July}}{4\text{th August}}$), Timbirsk ($\frac{24\text{th July}}{5\text{th August}}$), Mohilev (date not stated), Kostroma ($\frac{1\text{st}}{13\text{th}}$ August), Astrakhan ($\frac{3\text{rd}}{15\text{th}}$), Samara ($\frac{5\text{th}}{17\text{th}}$), Penza ($\frac{9\text{th}}{21\text{st}}$), Riazan ($\frac{10\text{th}}{22\text{nd}}$), Vladimir ($\frac{13\text{th}}{25\text{th}}$), Perm, ($\frac{14\text{th}}{26\text{th}}$), Viatka ($\frac{17\text{th}}{29\text{th}}$). In *September*, Smolensk ($\frac{27\text{th August}}{8\text{th September}}$), Orenburg ($\frac{3\text{rd}}{15\text{th}}$ September), Ufa* ($\frac{11\text{th}}{23\text{rd}}$).

The intensity of the epidemic varied very considerably in the different Governments. It was greatest in Bessarabia and Podolia; and next in order of intensity came St. Petersburg, Kherson, Grodno, Volhynia, Ekaterinoslav-with-Taganrog, Kursk, and Poltava.

The diffusion of this year, starting from Volhynia, where the disease had existed throughout the winter, appeared in one province in March,

* Ufa is a Government, with the town of Ufa as capital, constituted by a division of the former Government of Orenburg.

one also in April, and one in May ; 10 provinces in June, 20 in July, 12 in August, and 3 in September. It had not entirely ceased when the year closed, and it continued in the province of Tambov until the $\frac{19\text{th}}{31\text{st}}$ January 1867, and in the province of Minsk until the $\frac{31\text{st January}}{12\text{th February}}$. From the $\frac{1\text{st}}{13\text{th}}$ January 1866 to the $\frac{31\text{st January}}{12\text{th February}}$ 1867, the number of attacks was 208,858 [? 207,953], and of deaths 72,386. (See *Appendix*, Table VII.).

Poland.—The returns for Poland are not included in Dr. Arkhangelsky's account of the prevalence of cholera in Russia in 1866. According to an official return furnished to this department, cholera, in that year, caused 43,007 seizures and 17,799 deaths in this kingdom. The details of distribution of the disease in the several governments of the kingdom are not given, but it would appear that the first case of cholera was observed in Warsaw on the $\frac{11\text{th}}{23\text{rd}}$ July. The fixed population of Poland in 1865 was 5,336,210, the floating 206,962, total 5,543,172. *Poland*, 1865.

Italy.—Throughout the winter of 1865–66 and following spring, cholera had not wholly ceased in Italy. In December 1865, 746 deaths from the disease had been recorded, and in the three succeeding months, January, February, and March, 1866, the numbers were respectively 39, 16, and 3.* In April 2 deaths were recorded, in May 1 only, and in June 3. The next month, July, the disease became active, 76 deaths being recorded during the month, and at the close of the year the mortality had reached 19,571. In the progress of this year's prevalence 45 provinces were affected as compared with 34 in the previous year. All the provinces which suffered from the disease in 1865, with three exceptions (Ascolo Piceno, Macerata, and Ravenna), were again affected, although in some instances but nominally, in 1866. One only of these provinces suffered to a greater extent in 1866 than in 1865, namely, Naples, the mortality in the first-named year (the year under consideration, 1866) having been 5,393 ; in the last-named year (1865), 3,379. On the other hand the mortality which in 1865, had been in Ancona, 3,138, Capitanata 2,336, and Terra di Bari 1,636, was, in 1866, in these provinces respectively only 7, 70, and 77. The provinces in which the epidemic prevailed most in 1866 were Palermo, Naples, Genoa, and Cuneo. (See *Appendix*, Table XX.). The following is a summary statement of the mortality from this year's diffusion in Italy :— *Italy*, 1866.

Italy, 1866.

Population of Communes attacked.	Deaths from Cholera.			
	Males.	Females.	Total.	Per 10,000 of population.
5,160,620	10,348	9,223	19,571	37·3

Notwithstanding the prevalence of cholera in 1865 and 1866 in numerous parts with which Sicily was in regular communication, that island escaped the disease until September of the latter year. This freedom from the epidemic was attributed to the great stringency of the quarantine maintained in its ports. In September 1866 an insurrection broke out in Palermo, and it became necessary to despatch a body of *Sicily*, 1866.

* So stated in the official Report for 1865 (p. 96) ; but in the the official Report for 1866–67, the deaths from cholera in these months are stated to have been, January 5, February 5, March 2.

troops there from Naples, where cholera was prevalent, for its suppression. These troops were landed at once on their arrival, the quarantine regulations being set aside under the emergency. On the 18th September a detachment arrived in the harbour of Palermo among whom several cases of cholera occurred the same day. The disease next appeared among the civil population of the portion of the town adjoining the parts first occupied by these troops, namely Castelluccio and Via dell' Acqua Santa. The civil lazaretto situated in the street just named, was converted for the time being into a cholera hospital, and when on the 22nd September communications had been re-established with the city, 22 cases of cholera, soldiers and civilians were under treatment there. The disease now spread into the city and prevailed in it until the 29th December, killing, from first to last, 3,977 persons, of whom 405 were soldiers.*

From Palermo the disease extended to neighbouring districts of the island, and from the date of its introduction to the end of the year caused not less than 7,273 deaths, of which number 5,688 occurred in the province of Palermo.

Austria, 1866.

Austria.—Cholera in 1865 had effected a lodgment at one spot, at least, in the Austrian Empire, namely, Trieste. Here 83 cases of the disease, of which 60 died, were recorded in that year. In 1866 cholera reappeared in that town and caused 432 deaths, the cases numbering 734. The disease, moreover, extended this year throughout the greater portion of the Empire. The special information in my possession regarding this diffusion does not include the district in which Trieste is situated (Istria), and the neighbouring districts of Carniola, Croatia, Slavonia, and Dalmatia. Hungary also is not included, although cholera is known to have been widely diffused in that division of the Empire in 1866. The following Table shows the extent of prevalence of the disease in other parts of the Empire.†

It will be observed that the starting point of the diffusion of 1866 in Austria, so far as the following data throws light upon it, was not in the southern district which had been infected the previous year, but in the Bukovina. This district is contiguous to the provinces of Russia where cholera had persisted throughout the winter of 1865–66, and where it had earliest manifested activity in the spring of 1866.

Austria, 1866.

Provinces	Dates of beginning and cessation of Diffusion.	Number of Localities affected.	Population.	Cholera.	
				Attacks.	Deaths.
Bukovina -	20th May–30th Nov.	150	282,632	12,003	5,335
Bohemia -	10th June–30th Sept.	1,623	1,362,741	65,363	30,367
Galicia -	3rd July - -	(*see* 1867)	—	—	—
Moravia -	9th July–8th Sept. -	1,584	1,361,778	109,368	48,758
Styria - -	1st Aug.–17th Nov. -	47	24,501	453	293
Silesia -	11th Aug.–30th Sept.	160	204,234	5,838	2,217
Lower Austria	27th July–30th Sept.	498	406,545	26,527	9,909

* *Il Colera di Palermo nel* 1866. Relazione de Cordao Tommasi già Direttore del servizio Sanitoria Municipale.

† Dr. Arkhangelsky states that according to the Central Statistical Committee of the Austrian Empire, there were in Hungary, in 1866, 69,628 deaths from cholera, the total deaths from the disease in Austro-Hungary being 234,920.

France.—No official general return of the mortality from cholera, and of its distribution, in the different parts of France, in 1866 and subsequent years of the period considered in this report, has been published. Such knowledge as exists on the subject is chiefly contained in the information on epidemics in France communicated to the Academy of Medicine and reported upon annually. The report presented to the Academy for 1866 * shows that cholera had been present that year in 229 communes, scattered over 66 arrondissements, in 34 departments. But this return does not represent the whole extent of prevalence of the disease, for from many localities the Academy had not received information. Such as it is, when compared with the official return for 1865, it proves that the disease was more extensively diffused in France in 1866 than in the year previous. In 1865 the number of communes affected had been 186, scattered over 36 departments. The names of 17 departments appear in the report of the Academy that were newly infected in 1866; these were Aisne, Alpes-Maritimes, Ardennes, Aube, Charente-Inférieure, Cher, Côte-d'Or, Marne, Marne (Haute), Meurthe, Meuse, Morbihan, Puy-de-Dôme, Rhin (Bas), Sarthe, Sévres (Deux), and Vendée. Of the 36 departments infected in 1865, the same report shows that the disease reappeared in 18 in 1866, namely, Nord, Seine-et-Maine, Finistère, Pas-de-Calais, Seine-et-Oise, Seine-Inférieure, Gard, Meurthe, Loire-et-Cher, Nièvre, Calvados, Ille-et-Vilaine, Manche, Morbihan, Loire-Inférieure, Bouches-du-Rhône, Hérault, and Yonne.

The departments, and the number of arrondissements and communes in them, affected with cholera in 1866 according to the report of the Academy of Medicine, were as follows:—

Department.	Affected with Cholera.		Department.	Affected with Cholera.	
	Arrondissements.	Communes.		Arrondissements.	Communes.
Aisne	1	2	Marne	1	1
Alpes-Maritimes	1	8	Marne (Haute)		
Ardennes	2	2	Meurthe	2	14
Aube	1	1	Meuse	3	8
Bouches-du-Rhône	1	2	Morbihan	5	43
Charente-Inférieure.	2	18	Nièvre	4	13
			Pas-de-Calais	1	3
Cher	1	1	Puy-de-Dôme	2	4
Côte d'Or	2	5	Rhin (Bas)	—	Several.
Cotes-du-Nord	3	18	Sarthe	1	1
Finistère	2	17	Saône (Haute)	1	1
Gard	1	1	Seine-Inférieure	1	1
Hérault	1	1	Seine-et-Marne	4	17
Ille-et-Vilaine	3	9	Seine-et-Oise	4	5
Loir-et-Cher	2	6	Sévres (Deux)	1	5
Loire-Inférieure	1	1	Vendée	1	7
Maine-et-Loire	1	1	Yonne	2	7
Manche	1	1			

The report of the Academy gives no account of cases and deaths in the several localities where cholera prevailed in France in 1866. It does not even refer to the prevalence of the disease in Paris and the Department of the Seine, the report being restricted to the information directly communicated to the Academy. Paris suffered from cholera to almost as great an extent in 1866 as it had suffered in 1865. The following

* Mémoires, t. 28.

return, in which I have also included the facts for 1865, is derived from the *Bulletin de Statistique Municipale*, published monthly under the authority of the Prefect of the Seine.

Deaths from Cholera and Diarrhœa in Paris, 1865-1866.

Months.	1865.		1866.	
	Diarrhœa.	Choleraic Diarrhœa and Cholera.	Diarrhœa.	Choleraic Diarrhœa and Cholera.
January - - -	27	4	24	23
February - -	22	4	37	9
March - -	19	10	29	11
April - -	29	7	30	5
May - - -	37	17	32	9
June - -	47	26	42	12
July - - -	81	73	73	1,743
August - - -	111	71	74	2,495
September - -	109	179	61	967
October - - -	150	4,653	31	217
November -	72	1,318	18	12
December - -	37	291	27	6
	741	6,653	478	5,509

Calvados is another department which was affected with cholera in 1866 not referred to in the report of the Academy of Medicine. From a report on the prevalence of cholera in this department in 1873, by Dr. Denis Dumont*, it incidentally appears that in 1866 the disease occurred in a small hamlet of the commune of Bretteville-au-Laize, in February of that year, and attacked there 30 persons, of whom 20 died. It caused also 25 deaths in the commune of Oyestreham, and 215 deaths in the town of Caen, the cases in the last-named place numbering 620.

Belgium, 1866.

Belgium.—Dr. Van den Corput states† that Belgium was invaded by cholera in 1866 at four points. The disease was imported from France into Roosbrugghe-Haringhe on the 15th March, and into Messancy (Luxemburg) on the 1st May; from Holland into Gand on the 11th May; and by a Bremen ship, carrying emigrants, into Antwerp on the 15th May. These were the starting points of the subsequent diffusion in the kingdom, of which the general results are given in the accompanying table, and which attacked 62,899 persons, and caused from the 1st May to the 15th October, inclusive, 32,812 deaths, among a population o 4,893,021.

* *Rapport sur l'Epidémie cholérique de* 1873 *dans le Calvados.*

† *Bulletin des Epidémies* (*Journal Publie pour la Société Royale des Sciences Médicale et Naturelle, Bruxelles,* 1866).

Belgium.*—(*1st May to 15th October* 1866.)

	Population, 31st December 1863.	Cholera.	
		Cases.	Deaths.
Provinces.			
Anvers	471,908	9,181	4,588
Brabant	839,301	15,533	9,034
Flanders, West	652,372	3,703	1,950
Flanders, East	816,232	9,216	5,114
Hainault	845,961	9,836	4,104
Liége	554,739	10,988	5,822
Limbourg	199,242	412	216
Luxembourg	206,291	1,975	974
Namur	306,975	2,055	1,010
Total	4,893,021	62,899	32,812
Towns.			
Anvers	120,444	4,865	2,306
Bruxelles	184,932	3,966	3,028
Bruges	50,981	1,511	773
Gand	122,900	4,135	2,187
Mons	27,173	772	403
Liége	101,710	4,330	2,582
Namur	26,204	1,019	492
Total	634,344	20,598	11,771

Netherlands.—No province of the Netherlands escaped the diffusion of 1866. The total mortality from cholera throughout the kingdom during the year was 19,686, the population being estimated on the 31st December 1865 at 3,530,047. The distribution of the mortality in the different provinces was as follows :—† *Netherlands, 1866.*

Province.	Population, 31st Dec. 1865.	Deaths from Cholera.	Date of first recognised Case.
Gelderland	427,852	1,458	20th April (Herwijnen).
South Holland	672,367	7,688	8th April (Rotterdam).
North Holland	566,803	2,594	12th May (Haarlemmerliede an Spaamwouda).
Zeeland	176,169	252	19th May (Tholau).
Utrecht	172,787	2,695	6th April (Utrecht).
Friesland	288,991	461	19th May (Lemsterland).
Overyssel	250,766	1,017	11th June (Genemuiden and Zwartsluis).
Groningen	224,237	1,525	13th May (Wildervank).
Drenthe	104,037	384	4th June (Hoogeveen).
North Brabant	396,420	1,167	23rd April ('sHertogenboosch).
Lemburg	222,578	450	1st July (Sint Pieter).
Netherlands	3,530,047	19,686	6th April (Utrecht).

Saxony.—In Saxony cholera reappeared in 1866 in the government of Leipzig, where the first death from the year's diffusion occurred on the 29th June; and the disease did not wholly cease until the 25th *Saxony, 1866.*

* Furnished by M. Heuschling, Secretary of the Central Statistical Commission of Belgium, to the Registrar-General (Weekly Returns, 1866, p. 885).

† *De Cholera epidemie in Nederland, in* 1866 *en* 1867.'s Gravenhage, 1873.

December, or thereabouts, when the last death was recorded in the government of Zwickau. In 1865 the disease had appeared in twenty-five places in Saxe-Altenburg and Saxony, and caused there 468 deaths. Seventeen of these places were in the kingdom of Saxony, and in these places 358 of the deaths occurred. In 1866 the number of places affected by the diffusion in the kingdom of Saxony was 330, and the mortality occasioned by it was 6,736. The distribution of this mortality in the several divisions of the kingdom, together with the period during which it occurred and the number of places affected by the disease, are shown in the following Table compiled from the official returns :—*

Governments.	Population, 1865.	Deaths from Cholera.	Number of Localities affected with Cholera.	Period during which the Deaths happened.
Dresden - -	615,169	236	27	4th July–22nd Oct.
Leipzig - -	532,689	3,376	133	29th June–26th Nov.
Zwickau - -	872,448	2,597	115	14th July–25th Dec.
Bautzen - -	316,886	527	55	21st July–30th Oct.
Total -	2,343,994	6,736	330	

Prussia, 1866.

Prussia.—Cholera appeared first, this year, in this kingdom, in the Government of Treves, Rhenish Prussia, on the 2nd February. The disease spread generally throughout the kingdom, with the exception of the province of Hohenzollern and the Territory of Jahde, prevailing in the Governments of Treves and Arnsberg until January 1867, in the government of Dusseldorf until February, and in the government of Merseburg until an unstated period in the same year. In the several Governments mentioned, and also in other parts of the kingdom, cholera reappeared in 1867. During the prevalence of cholera in Prussia, in 1866, the recorded attacks from the disease among the civil population were 224,382, and deaths 114,683.

The following is a summary statement of the distribution of the sickness and mortality in the several provinces of the kingdom, the distribution in the different Governments being given in the Appendix (See *Appendix*, Table XXVII.).†

Prussia.—Cholera 1866.

Province.	Civil population 1864.	Cholera.		Duration of diffusion.
		Attacks.	Deaths.	
Prussia - - -	2,982,215	36,600	19,161	6 June–21 Dec.
Posen - - -	1,505,944	42,023	20,161	15 „ –30 Nov.
Brandenburg -	2,476,148	32,137	17,949	2 „ –3 Dec.
Pomerania - -	1,418,721	20,716	14,102	29 May–30 Dec.
Silesia - - -	3,473,259	37,623	20,757	25 June–31 „
Saxony - - -	1,948,609	27,349	13,395	2 July–1867.
Westphalia -	1,374,697	5,074	2,435	28 June–14 Jan. 1867.
Rhine - - -	2,834,028	16,660	6,723	2 Feb. 1866–16 Feb. 1867.
Hohenzollern - } Jahde - - - }	Free from cholera.			
Totals - -	13,031,621	224,382	114,683	2 Feb. 1866–16 Feb. 1867.

* *Erster Jahresberricht des Landes Medecinal Collegiums, über das Medicinalwesen in Konigreich Sachsen* auf das Jahr 1867. Dresden, 1869.

† I am indebted for the particulars relating to the prevalence of cholera in Prussia in 1866 and 1867, to a paper by Dr. Engel, (Die Cholera-Epidemie des Jahres 1866 mit einen Rückblick auf die früheren Epidemien) published in the *Zeitschrift des Königlich Preussischen Statistischen Bureaus* for 1869, p. 70.

Denmark.—I quote Dr. Schleisner's account of the extent to which Denmark was affected by the diffusion of 1866 :—* *Denmark*, 1866.

"In 1866 when cholera prevailed in the greater number of the ports of the Baltic, 2,233 ships coming from ports or anchorages infected with the disease anchored in the roads of Copenhagen from the 6th May to the 7th November. Of these ships, 1,490 bound on long voyages anchored but a very short time in the outer roadstead ; 286 anchored for a longer time in the inner roadstead ; and 457 came into port for the purpose of loading or discharging cargo. Not less than 88 cases of cholera and suspicious diarrhœa were brought into the different anchorages, of which 30 were treated on board ships, whilst 58 were removed to a hospital specially established for the purpose at a distance from the city and quite isolated. In the city itself but four cases of cholera occurred. The first took place on the 8th October, the patient being the wife of a workman engaged in carrying coal, and who associated daily in the port with foreign sailors. Two days after two fresh cases of cholera occurred in the same house. The three patients were, as soon as their sickness was known, removed to the cholera hospital, and the inhabitants of the house who had communicated with them, eight in number, were also removed to an isolated locality, where they were kept under observation seven days. The fourth case took place eight days afterwards in another quarter of the city, and was dealt with in the same manner. I believe that the spread of the disease here was stopped by these measures."

Sweden.—The diffusion of 1866 extended to 25 of the 29 districts into which Sweden is divided, and in these districts it attacked 216 communes. The districts which principally suffered from the epidemic were Stockholm (town), Gotenburg, and Bohus, Elfsborg, Ostergötland, Wester-Norrland, Gefleborg, and Wermland. The attacks from cholera numbered 12,799, the deaths 4,503. The population of the infected districts in 1865 was 4,039,680, the total for the whole of Sweden being 4,116,141. The distribution of the attacks and deaths in the different districts of the kingdom is shown in the Appendix, Table XXI. *Sweden*, 1866.

Norway.—The incidence of the diffusion of 1866 upon Norway was very slight. The localities chiefly affected were the municipal districts of Christiana and Christiansand, 38 cases and 27 deaths occurring in the former district, and 15 cases and seven deaths in the latter district. The total number of cases in the kingdom was 79, and of deaths 51. These were distributed in the principal divisions as follows : Christiana (38 cases, 7 deaths) ; Akershus (2 cases, 2 deaths) ; Smaalene (1 case) ; Buskerud (12 cases, 7 deaths) ; Jarlsberg and Laurvig (9 cases, 7 deaths) ; Nedencœs (2 cases, 1 death) ; Manal (Christiansand, 15 cases, 7 deaths.) The several occurrences of cholera took place during the months of August and September, the first originating in the importation of the disease into Christiana.† *Norway*, 1866.

The British Islands.—The reappearance of cholera in England in 1866 was connected not with recrudescence of the disease in the localities which had been infected the previous year, namely, Southampton and Theydon-Bois, but with a series of re-infections from the Continent, one *The British Islands*, 1866.

* *L'apparition du choléra en Danemarc depuis sa première invasion en Europe, comparèe avec l'apparition de la maladie dans les pays limitrophes et les ports voisins.* (Communicated to the International Sanitary Conference of 1874, and printed in the Proceedings of the Conference.)

† *Norges Officielle Statistik udgiven i aaret* 1868, *Medicinal Beretning* for 1866, p. xiv.

instance only excepted, where the source of re-infection was probably Egypt. The facts in reference to this subject, so far as they were then known, were given in my report on cholera in the metropolis in 1866, and I repeat them here with such additions as are necessary.*

"At the outset of the increased diffusiveness of the epidemic in 1866 England came within its range. Before, indeed, any news had reached this country of cholera having appeared in Holland, and before probably the existence of the disease was suspected in that country itself, two events had occurred at sea in ships sailing from an English port, of remarkable interest.†

"On the 28th March 1866 the screw-steamer 'England' sailed from the Mersey, [bound for New York,] having on board 807 passengers, more than half of whom were foreigners, Dutch and German, who, a few days before, had journeyed to Liverpool from Rotterdam by way of Hull. The vessel touched at Queenstown on the evening of the 29th, and there received additional passengers to the number of 393. Five days subsequently cholera appeared among the foreign emigrants, extended rapidly in the steerage, and when on the 20th April—17 days after the commencement—the outbreak came to an end, in Halifax harbour, the sick-roll included upwards of 500 cases, the death-roll at least 280.

"Six days after the 'England' had sailed from the Mersey, a sister ship, the 'Virginia,' followed from the same harbour. She had then on board 807 passengers, of whom 465 were foreigners who had also travelled to Liverpool from Rotterdam by way of Hull. This ship, as the 'England,' touched at Queenstown, to complete her complement. On the eighth day after sailing cholera broke out on board, again among the foreign passengers; and in 41 days, on the voyage and at the New York quarantine station, swept off 105 souls.

"Before a knowledge of these facts, and of the probable transmission of the infection of cholera across the kingdom, had reached England, an instance of importation of the disease into the West Midland counties occurred. On the 22nd of April, before which date cholera had shown itself in Rotterdam, a traveller sailed from that port for London. He had dwelt in the former city only since the 11th of the month, having on that day arrived there from Java. He reached the metropolis early on the morning of the 23rd, and proceeded at once by railway to Bristol. While in the train he was taken ill, and after 18 hours sickness he died, having manifested all the symptoms of confirmed Asiatic cholera.

"On the 2nd May two German emigrants died from cholera in Liverpool; others also succumbed to the disease in the town before embarkation and previous to the close of June. All had travelled to Liverpool by way of Rotterdam. During the two months three vessels carrying Dutch and German emigrants, sailed from the Mersey, each of which suffered from an outbreak of cholera. One, the 'Helvetia,' put back when the disease appeared, and her passengers underwent a sharp visitation in the Mersey.

"From the 13th May to the 26th of June five cases of cholera were registered in the borough of Liverpool, apparently 'quite unconnected with foreign emigrants.'‡ On the 1st July an undoubted case of

* On Cholera in London, and especially in the Eastern Districts (1866). *Ninth Report of the Medical Officer of the Privy Council*, p. 265.

† The earliest notifications I have seen of the presence of cholera in Europe in 1866, are Roosbrugghe-Haringhe, West Flanders, the 15th March; Utrecht, the 6th April; and Rotterdam the 8th April.

‡ See the Report of Dr. Trench, Medical Officer of Health for the Borough, on the health of Liverpool during the March and June quarters of 1866. Dr. Trench states that the "Virginia" left the Mersey "with 721 souls on board, of whom 260 were foreigners." The figures in the text were taken from official information

epidemic cholera among the ordinary population occurred, the starting point of the subsequent outbreak.

"But in the meanwhile the epidemic had appeared elsewhere in the kingdom. Between the 10th and 13th of June it broke out again in Southampton, and from the 12th to the 17th of the same month cases occurred at Northwich, in Cheshire, a small market town, situated about 24 miles in a direct line, S.E. of Liverpool and Birkenhead. On the 23rd June a boy died from cholera in the South Dock, Sunderland, on board a steamer from Stettin. On the 28th and 29th June two fatal cases occurred in Goole harbour on board an English steamer which had arrived the morning of the first-named day from Antwerp. On the 29th also a death from cholera took place on board a barque which had arrived that day, from Hamburg, in the Tyne, off Shields. A fatal case, moreover, occurred on the 1st July off the east coast at Harwich, in a vessel from Brussels; and another fatal case on the 3rd July on board a coasting vessel, off the south coast in Torbay."

The reappearance of the disease in Southampton was of peculiar interest. It followed upon the arrival in the port of the "Poonah," one of the ships of the Peninsular and Oriental Company, with cholera among the crew. She entered the port on the 10th June, a fireman having died on board the day previous from cholera; and several of the crew, who landed from her ill, were subsequently seen by medical men and were found to be suffering from severe choleraic diarrhœa. The disease spread in the town, and 101 cases, 48 of which were fatal, occurred during the eighteen weeks ending the 15th October. This outbreak was subjected to a detailed examination by Professor Parkes,† and the history, as then ascertained, appeared to show that the disease had originated among the crew after the ship had left Gibraltar, and that it had been determined by water, distinctly polluted by sewage, believed to have been taken on board there. There was a serious doubt, however, whether any water had been obtained for the ship at Gibraltar. The whole of the investigation by Professor Parkes was prosecuted under the belief, which at that time appeared to admit of no doubt, that cholera did not exist in Alexandria at the time when the "Poonah" sailed from that port, or at any of the intermediate ports touched at by the ship. I shall have to show when I describe the course of the epidemic in Lower Egypt, subsequent to 1865, that cholera had reappeared there early in 1866; and it is highly probable that the disease was present in Alexandria when the "Poonah" sailed from that port on the 28th May 1866, after 40 hours' stay there. No reappearance of the disease seems to have been observed in 1866, either in Malta or in Gibraltar, but in Lower Egypt there was a recurrence which persisted over several months, (Alexandria being affected among other places), and which was concurrent with reawakened activity of the epidemic in the Hejaz and on the coasts of the Red Sea (*See* pp. 95–99.) If the water which manifestly determined the outbreak on the "Poonah" was obtained from Alexandria, there can be little doubt of the source of its infection. If it were not obtained there, hardly less, doubt, I imagine, can exist that it, or the tank which contained it, in some way became infected there. But in whatever manner the question may be regarded of the mode of introduction of the infection on board the ship, and its relation to the water-supply contained in a particular tank, the cardinal fact is that the disease appeared when the vessel was thirteen days out from an infected district.

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furnished to the Department; but Dr. Trench's statement accords most with information subsequently obtained from the master of the vessel at New York (see p. 79).

† On cholera in Southampton (1866). *Ninth Report of the Medical Officer of the Privy Council*, p. 244.

App. No. 1.
On Cholera, by Mr. J. Netten Radcliffe.

Europe, 1866.

Cholera spread widely in England and Wales, less widely in Scotland and Ireland during 1866, and the mortality it occasioned in the three kingdoms was as follows :—

	Population, 1861.	Deaths from Cholera, 1866.
England and Wales,	20,066,224	14,378
Scotland	3,062,294	1,270
Ireland	5,764,543	2,501
		18,149

The distribution of this mortality in the several kingdoms is shown in the Appendix (Tables XXII., XXV.). The history of the diffusion of 1866 in England and Wales, elaborately written by Dr. William Farr, F.R.S., and enriched with much important matter relating to cholera, has been published as a supplement to the Registrar-General's 29th Annual Report.

The Diffusion in Europe, 1867.

1867.—Cholera continued more or less prevalent in many parts of Europe in 1867. The area of diffusion this year included, for the first time since the appearance of the disease on the south coast of the Continent in 1865, Switzerland, Dalmatia, Montenegrin, Albania, and Sardinia. Poland suffered generally from the year's diffusion, but 10 only of the governments of Russia in Europe were affected as compared with 55 in the previous year's diffusion. The disease was generally prevalent throughout Galicia, but elsewhere in the Austro-Hungarian Empire isolated outbreaks of no great magnitude, and limited to Hungary, Slavonia, and Dalmatia, appear alone to have occurred. No province of Prussia and of the Netherlands which had been affected in 1866 wholly escaped, but the incidence of the disease was slight as compared with that year. Several departments of France again suffered considerably. A hamlet in the vicinity of Cadiz was the scene of an isolated outbreak in Spain. In Italy cholera was more generally spread and more fatal in this year than in the two preceding years, Sicily suffering especially from the disease. Finally, an outbreak occurred in Switzerland, at Zurich, apparently an offshoot of the prevalence in Italy.* (*See* Map IV.).

Russia in Europe, 1867.

Russia in Europe.—Cholera first manifested itself in Russia in 1867, at the beginning of the year, in St. Petersburg. The diffusion of the previous year had ceased in that government on the $\frac{30\text{th November}}{12\text{th October}}$. The first case in 1867 occurred on the $\frac{1\text{st}}{13\text{th}}$ January, but the disease although it it did not entirely cease until the close of the year, never obtained any considerable proportions, for not more than 275 cases were

* In 1867 cholera was prevalent at several points of South America on the east coast, and in the interior, propagated there, it is stated, in the first instance, from the United States. The disease was carried from Rio Janeiro to the army in Paraguay, and it afterwards spread widely in the Argentine Confederation, and in the towns on both banks of the Rio de la Plata, Monte Video being last infected. Buenos Ayres suffered both in 1867 and 1868, about 6,000 deaths from cholera occurring from the appearance of the disease in 1867 to the end of February 1868. Cholera broke out at Belize, British Honduras, in December 1867, and extended to the neighbouring district and into Yucatan. (See an account of this last-mentioned outbreak by Staff-Assistant Surgeon Kearney, *Army Medical Department Report* for 1868, Vol. X., p. 317.)

recorded during the 12 months, and 139 deaths. Cases and deaths were reported in nine other provinces, namely, Vilna, Vitebsk, Volhynia, Grodno, Kovno, Kursk, Minsk, Riazan, and Kharkov, but in one only did cholera become largely prevalent. In Minsk there were 4,076 cases and 1,360 deaths from the $\frac{1}{13}$th June to the $\frac{6}{18}$th November. In Vilna 546 cases and 221 deaths happened, but in none of the other provinces did the cases and deaths reach these numbers. In Vitebsk the cases were only 65, the deaths 5 ; and in Riazan the cases and deaths were even fewer in number. The total number of cases reported in the several governments affected (all of which had suffered from the previous year's diffusion) was 6,245 ; the total number of deaths, 2,298. The distribution of these cases and deaths in the different governments is shown in the Appendix (*See* Table VIII.).

So inconsiderable was the manifestation of cholera this year in Russia, with the exception of the government of Minsk, that many medical men, Dr. Arkhangelsky states, believed that the disease recorded was principally *cholera nostras*.

Poland.—Dr. Arkhangelsky includes Poland in his account of this year's diffusion of cholera in Russia. The disease appeared at the same date (April $\frac{9\text{th}}{21\text{st}}$) in the governments of Warsaw and Lublin, and subsequently became prevalent in the other governments of the kingdom, although very slightly so in Lomjin and Souvalki, ceasing in Baletz on $\frac{20\text{th December } 1867}{1\text{st January } 1868}$. The total number of cases in the whole kingdom was 27,018 ; of deaths 11,265. (See *Appendix*, Table IX.)

Poland 1867.

Austria.—Galicia, the province bordering upon the infected districts of Poland and South-western Russia seems to have been alone affected with cholera in Northern Austria in 1867. The disease appeared in this province on the 3rd July 1866, and continued uninterruptedly until the 12th March 1867. Within this period there were 65,761 cases and 31,336 deaths among a population of 1,686,708. Certain counties of Hungary are stated to have suffered from cholera in 1867, few in number, but I have no definite information regarding them. The disease was reported to have broken out in Austrian Brood at the beginning of July. In Southern Austria cholera reappeared in Trieste, causing there, between the 15th August and 14th October, 366 seizures and 235 deaths ; and the disease now first seems to have manifested itself, during this epidemic, in Dalmatia and adjoining provinces. The district of Ragusa was attacked in June, the Herzegovina, within Austria, somewhat later. Numerous villages were affected and several of the largest towns, but the disease, although widely diffused, did not as a rule show itself (so far as an opinion may be formed from imperfect details) in these localities with any great intensity. At the time that cholera was prevalent in this portion of the Austrian Empire, it was prevalent also in Turkish Herzegovina, Montenegrin, and Northern Albania.

Austria, 1867.

Prussia.—The diffusion which began in Prussia in February 1866, continued uninterruptedly until the middle of February 1867, when it ceased for the moment, having lingered longest in the province of the Rhine, within the government of Dusseldorf. The return given by Dr. Engel for 1867, (the only one relating to this year which has yet come under my observation,) is imperfect, not including the records for the city of Berlin, and the governments of Königsberg, Posen, Magdeburg, Minden, and Kiel. So far as this return goes, it would appear that the disease reappeared, in March, in the governments of Coblenz and Treves,

Prussia, 1867.

Rhenish Prussia, and subsequently in other provinces; and after continuing to the close of the year it died out altogether. In one district only, the government of Dusseldorf, was this year's prevalence as considerable as that of 1865. Elsewhere the incidence of the disease was slight. The total number of seizures of cholera recorded among the civil population during the year was 11,173, of deaths from the disease 5,797, the corresponding figures for the previous year being 224,382 and 114,683. In 1867 the returns included the provinces annexed to Prussia in 1866, namely, Schleswig-Holstein, Hanover, Hesse-Nassau, and Lauenburg. Of the state of cholera in these provinces in 1866, (if there were any prevalence of the disease within them in that year,) I have no knowledge. The total seizures from cholera in these provinces in 1867 were 332; the total deaths, 234. The following is a summary of the distribution of the sickness and mortality from cholera in the kingdom in 1867. A more detailed statement is given in the Appendix (*See* Table XXVIII.).

Prussia.—Cholera, 1867.*

Provinces.	Civil Population, 1864.	Cholera.		Duration of Diffusion.
		Attacks.	Deaths.	
Prussia - - -	3,014,595	1,551	910	14 June - 30 November.
Posen - - -	1,523,729	124	53	14 July - 13 October.
Brandenburg - -	2,616,583	15	7	9 „ - 15 „
Pomerania - -	1,437,375	1	1	25 „ - 25 „
Silesia - -	3,510,706	2,053	1,110	6 April - 8 November.
Saxony - - -	2,043,975	422	103	6 September - 16 „
Westphalia - -	1,666,581	330	195	12 August - 28 December.
Rhine - - -	3,346,195	6,677	3,418	1 January - 20 „
Hohenzollern -	64,958	—	—	——
Jahde - - -	1,573	—	—	——
Schleswig Holstein	960,996	4	4	28 August - 6 September.
Hanover - -	1,923,492	308	217	27 „ - 21 October.
Hesse-Nassau -	1,203,297	20	13	17 May - 8 December.
Lauenburg - -	49,704	—	—	
		11,505	6,031	1 January - 28 December.

Montenegrin, 1867.

Montenegrin.—Cholera appeared in Montenegrin about the beginning of July. It had been preceded by famine and very fatal typhus, and, spreading throughout the principality, it was very virulent in several localities.

Turkey, 1867.

Turkey.—The starting point of this year's outbreak in Turkey, which included in its area Montenegrin, the Herzegovina, and Southern Dalmatia, would appear to have been in Northern Albania. Cholera was reported to be present at Rici, a village on the River Bojana, in this province, in April. Other villages in the neighbourhood were affected, but the outbreak here was circumscribed and the disease disappeared in May.

Italy, 1867.

Italy.—Beginning in 1865, continuing and becoming more widely prevalent in 1866, the epidemic culminated in Italy in 1867, and is

* Exclusive of the City of Berlin, and the Governments of Königsberg, Posen, Magdeburg, Minden, and Kiel.

reported to have come to an end on the 15th January 1868. Forty-five provinces had been affected in 1866; fifty-five were affected in 1867. The mortality which in 1865 (exclusive of Venetia) had been 12,901, in 1866 (now and in the following year, including Venetia) was 19,571, and in 1867, 128,075 [? 127,775]. The provinces which chiefly suffered from cholera in 1867, were those of the island of Sicily, where the mortality was enormous (nearly one half, 54,107, of the whole named deaths occurring there); and on the mainland Bergamo, Brescia, Capitanata, Como, Cremona, Genoa, Milan, Naples, Novara, Parma, Piacenza, Terra di Bari, Terra d'Otranto, and Turin. (See *Appendix*, Table XX.). Sardinia, which had escaped the two previous years, came within the area of the diffusion this year. According to local reports,* cholera appeared in the island, at Cagliari in the month of August, and spread to the district of the same name, and to the district and town of Iglesias, continuing throughout the months of September and October and ceasing in November. In the city of Cagliari (population, 1862, 28,244), there were 160 deaths: in the district (population, 30,905) 174 deaths, the total number of the cases in the city and district being 843. In the town and district of Iglesias (population, 1862, 6,224) there were 814 cases and 230 deaths (142 town and 88 district). The total number of cases in the island was 1,657, of which 564 were fatal.

Sardinia, 1867.

The following is a summary statement of the mortality from cholera in Italy during the three years 1865, 1866, 1867, and of the progress of the mortality from month to month in the several years, according to the general official reports previously referred to:

Italy.—Cholera, 1865, 1866, 1867.

	Population, 1862.	Deaths from Cholera.		
		1865.	1866.	1867.
Italy { Continental	18,797,087	12,901	12,298	73,403
Italy { Sicily	2,391,802	—	7,273	54,107
Italy { Sardinia (Island of)	588,064	—	—	565
Total	21,776,952	12,901 [? 12,885]	19,571	128,075 [?127,775]

Sicily, 1866-67.

Sicily.—Provinces.	Population, 1862.	Deaths from Cholera.	
		1866.	1867.
Caltanissetta	223,178	60	7,209
Catanea	450,460	687	12,053
Girgenti	263,880	98	12,516
Messina	394,761	6	4,483
Palermo	584,929	5,688	12,533
Syracusa	259,693	—	2,353
Trapani	214,981	734	3,160
Total	2,391,802	7,273	54,307

* *Sul Colera Asiatico che domino in Diversi Comuni della Provincia di Cagliari nel* 1867. Relazioni Storiche del Cav. Dott. Giovanni Falconi. Cagliari, 1868.

Italy.—(Months).	Deaths from Cholera.			
	1865.	1866.	1867.	1868.
January - - -	—	93*	888	107
February - - -	—	53*	362	—
March - - -	—	8*	808	—
April - - - -	—	2	693	—
May - - - -	—	1	2,421	—
June - - - -	1	3	22,962	—
July - - - -	576	76	39,256	—
August - - -	7,673	1,054	33,655	—
September - - -	3,520	5,918	16,509	—
October - - -	3,566	6,595	6,449	—
November - - -	6,633	4,945	2,229	—
December - - -	1,444	965	736	—

I have but one piece of information respecting cholera in the States of the Church in 1867. Cholera appeared in Rome on the 1st May, and from that date to the 20th October there were 3,024 seizures and 2,040 deaths.†

Malta, 1867.

Malta.—There was a slight reappearance of cholera in Malta this year (1867). Two women from Turin, and the captain of an Italian vessel died of the disease, at the beginning of July, in the lazaretto, Valetta:—"About the same date there were a number of cases of choleraic "diarrhœa among the civil population in some of the villages, and one "severe case was reported in the 64th Regiment at Zabbar Gate "Barracks. No further case of cholera occurred till the 23rd of "August, when a woman, residing at Valetta, was attacked and died "after 73 hours' illness; and several cases of choleraic diarrhœa, some "of which proved fatal, were reported among the civil population. On "the 30th August the 1st Battalion, 14th Foot, arrived at Malta from "Ireland, and six companies were immediately sent to Pembroke Camp, "getting thoroughly drenched by a storm on the line of march. The "same night a fatal case of cholera occurred at the camp in the wife of a "private of the 1st Battalion, 60th; a woman who in consequence of her "bad character had been struck off the strength of the regiment. On "the 2nd of September, a man of the 14th was attacked, and died in "9½ hours." Other cases followed among the troops in the camp, and elsewhere in the island, and 22 men died of the disease, 15 in September, 5 in October, and 2 in November. The deaths from cholera among the families of the soldiers during the same period were eight, four women and four children.‡

* The numbers for these months are taken from the Official Report for 1865. In the Official Report for 1866–67, the numbers are given as follows:—January, 5; February, 5; March, 2.

† Dr. Francesco Scalzi.—*Il Colera di Roma sul* 1867. Roma, 1868.

‡ The following is of interest with reference to contemporary prevalence of cholera in the Regency of Tunis:—The first person attacked with cholera in Leghorn (where from the 13th July to the 15th November there were 1,275 cases and 824 deaths), was a widow woman whose seizure occurred under the following circumstances:—In her house at the time of seizure a Tunisian family was lodging which had fled from Tunis in consequence of the prevalence of cholera there. Thirteen days after this family had landed, and after it had been subjected to quarantine, a child sickened from diarrhœa. The child was nursed by the widow, who while having it in charge was seized with cholera during the night of the 13th–14th July, and died in 24 hours. The other persons in the house, including the Tunisian family, all suffered afterwards with choleraic diarrhœa, and the child first seized died after a short illness.—*Relazune della Commissaire Municipale di Santà sul Colèra di Licorno.*

‡ Army Medical Department Report for 1867. Vol. IX., p. 49.

Switzerland.—The outbreak which occurred in Zurich in 1867 is believed to have been an offshoot from Italy. A family coming from Rome, and bringing with them a child suffering from diarrhœa, is held to have introduced cholera into Zurich during the last week of July. After that period cases began to occur in the city and vicinity; and from the 3rd August to the 10th October, 428 deaths from cholera were reported. Cases of the disease were stated at the time, but on doubtful authority, to have taken place also at Lausanne and elsewhere in Switzerland. *Switzerland,* 1867.

Spain.—At the end of October an outbreak of disease described as choleraic took place at San Fernando, a village situated on the coast six miles distant from Cadiz. 20 cases, of which 14 died, occurred within a few days. *Spain,* 1867.

France.—Cholera had not ceased in the departments of Pas-de-Calais, Côtes-du-Nord, and Ille-et-Vilaine at the end of 1866. In 1867 the disease continued in those departments and reappeared in others. According to the Report on Epidemics presented to the Academy of Medicine,* which, as already explained, refers solely to information on the subject communicated directly to the Academy, the disease in 1867 showed itself in 11 departments, and in these was distributed in 134 communes of 28 arrondissements, and caused 2,783 deaths. The departments affected and the distribution of the mortality in them were as follows:— *France,* 1867.

Department.	No. of Communes affected.	Deaths from Cholera.
Pas-de-Calais	20	116
Côtes-des-Nord	11	900
Ille-et-Vilaine	26	510
Charente-Inferieure	6	31
Finistére	11	676
Meurthe	4	20
Morbihan	21	159
Seine-et-Oise	2	25
Savoie	28	308
Nord	1	35
Ain	4	3

The Netherlands.—The epidemic is credited with 1,595 deaths in the Netherlands this year. Of these 1,033 occurred in the province of South Holland. The remainder were distributed in other provinces as follows:—Gelderland, 50; North Holland, 219; Zeeland, 48; Utrecht, 27; Friesland, 19; Overyssel, 4; Groningen, 3; Drenthe, 21; North Brabant, 102; Limburg, 69. *The Netherlands,* 1867.

Bavaria.—Cholera is reported to have broken out at Friesenheim (population 1,800) near Manheim, in August, and afterwards to have prevailed in several villages of Rhenish Bavaria. *Bavaria,* 1867.

1868.—This year cholera, so far as is known, manifested itself in an epidemic form in two localities only in Europe, namely, in the district of Lipowetz, government of Kiev, Russia, and in a valley on the River Rour, near Relinghausen, in Essen, Germany. In the district of Lipowetz the The Diffusion in Europe, 1868.

* *Mémoires* t. xxi.

settlements of Great Rostowka and Sollogoubowka were attacked, and 70 cases of cholera, of which 29 died, occurred in them from the 10th August to the end of the month. Thirteen isolated cases of cholera occurred in other parts of the province of Kiev, of which six were fatal. The total mortality from the disease within the province, from the 10th to the 27th August, was 35. The commencement of the outbreak in Germany is also dated the 10th August, and from that day to the 4th September there were 38 deaths from cholera in the locality which has been referred to.* *See* Map IV.

There was was no prevalence of cholera in the government of Kiev in 1867, but the disease was active in the adjacent governments of Minsk and Volhynia, inconsiderably so in the latter government, but causing 4,076 cases and 1,360 deaths in the former.

Dr. Arkhangelsky makes the following observations on the occurrence of cholera in Russia in 1868 :—

"Besides the cases referred to [in the government of Kiev], isolated cases of cholera happened during the hot season of the year in many provinces of Russia, but the medical men attributed such cases to sporadic cholera (*cholera nostras*). The greatest number of these cases were observed in the city of St. Petersburg (92 cases, 56 deaths), in other parts of the province of St. Petersburg (88 cases, 42 deaths), and in the city of Moscow (47 cases, 14 deaths). In general, however, sporadic cholera (*cholera nostras*) appeared oftener in the western parts of Russia, where the total number attacked by the disease reached 400, and the deaths from it 130. In the central and eastern districts the number attacked by *cholera nostras* was 150 and the deaths were 28.

"Was the epidemic in the province of Kiev really Asiatic cholera and not sporadic cholera (*cholera nostras*), as in the other provinces? or was the disease in the other provinces also Asiatic cholera occurring in isolated cases? These questions cannot be solved with certainty. The great number of cases of assumed sporadic cholera in the western part of Russia, and the number of deaths caused by the disease there at once arrest the attention and lead to a suspicion that the diagnosis of the local medical men was not accurate. But an examination of the climatic conditions of 1868 makes it probable that the cases in question were really not of specific origin. According to Mr. A. Voiekov the summer of 1868 was remarkable for the contrast in the distribution of rains in the western and eastern parts of Russia. At St. Petersburg, during the whole summer there were only 1·14 inches of rain, instead of the usual 6·56 inches. This drought spread itself eastwards to Kostromo, and southwards to Nikolaiev and Lougani, where the months of May and June were especially very dry. The forests lying between Nijni-Novgorod and the Prussian frontier were in July much damaged by fires which destroyed great quantities of trees. In the eastern part of Russia it was just the contrary. At Kosmodemiansk, in the province of Kasan, the rainfall in July was 4·03 inches above the average quantity. At Orenburg the months from May to September were unusually wet. Along the whole lower bank of the Volga a splendid harvest followed the timely rains. The Caucasus also came within the area of the unusual rainfall. At Tiflis, April, August, September, and October were particularly wet.†

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* I am indebted to Dr. Arkhangelsky's work for the details of the outbreak in Germany, as well as of the outbreak in Russia.

† A. Voiekov on the Distribution of Rains in Russia.—Meteorological Transactions (Russian), Vol. I., pt. 2. St. Petersburg, 1870.

"I think that the meteorological conditions here described are sufficient to account for a local origin of the cases of cholera occurring sporadically in Western Russia this year, and even for the isolated cases which were observed in the province of Kiev. But the relatively considerable prevalence of cholera in two adjoining villages of that province cannot be reasonably explained in this manner. Moreover, the development of cholera in the province of Kiev and other provinces the following year (1869), proves the existence of the specific cholera agent in the province of Kiev in 1868."

The development of cholera here mentioned by Dr. Arkhangelsky, refers to that recurrence of the disease in an epidemic form in the province of Kiev in 1869, which proved to be the beginning of another diffusion in Europe, almost if not altogether as considerable as that which began in 1865. This development will be a subject for separate consideration in another part of this report (Sec. IV). With the slight reappearances of cholera which occurred in Russia and Germany in 1868, the diffusion which began in Europe in 1865 virtually ended. I now, therefore, having completed this part of my subject, proceed to describe, before tracing out the other lines of diffusion along which cholera travelled in spreading from Alexandria in 1865, the several secondary diffusions from Europe, to Asia, to America, and to Africa.*

2.—*The Diffusion to the South and East Coasts of the Black Sea.*

North-east and Eastern Anatolia, 1865.

When in 1865 the scattering of cholera began from Constantinople to the west coast of the Black Sea, it began also to the south coast. Many persons sick from cholera, or corpses of persons who had died of cholera, were carried in the ordinary course of traffic by ships sailing from the Bosphorus into Sinope, Samsun, Trebizond, and Batum. The details of the importations into the ports and lazarets at Sinope and Batum are not known; but into Samsun 15 persons sick of cholera, and the corpses of 11 persons who had died at sea from the disease, and into Trebizond one sick person and six corpses were brought between the 25th July and the 28th August. At one only of the ports referred to did the disease extend to the population of the town, namely at Trebizond. Here the permanent lazaret was not capacious enough for the number of persons who were subjected to quarantine in it, at one period amounting to 600 under detention at the the same time, and it was necessary to camp out many in tents. Cholera broke out both in the permanent lazaret and in the encampment, and caused not less than 39 deaths. The vessel which brought the single case of cholera into the port, and landed it at the lazaret, arrived on the 25th July. Before this date cholera did not exist in the town, and had not been observed among the shipping. Soon after the arrival of this vessel a case of cholera, described as sporadic, was observed in the town, and from the beginning of August to the middle of September, 46 cases, of which 28 were fatal, happened there.

Armenia, 1865.

From Trebizond cholera was dispersed in two directions, one into Armenia the other into Caucasia. A body of Kurd and Armenian labourers coming from Constantinople, and passing through Trebizond,

* The year 1868 is remarkable for the seemingly wide occurrence of dearth in Europe and Northern Africa. Dearth is noted among papers before me in parts of Finland, Bothnia, Sweden, Norway, East Prussia, Hanover, Nassau, Galicia, Spain, Portugal, Algeria, and Tunis. In Algeria and Tunis the dearth was accompanied by wide-spread and very fatal typhus. There was dearth also in Siberia.

carried the disease to Erzerum, where it appeared on the 22nd August, and where from that date to the 12th December it attacked 517 persons, of whom 224 died. During its prevalence in that city 600 Tchetchen families coming from Cis-Caucasia, who passed through it seeking for a settlement in Diarbékr, contracted the disease, and carrying it with them infected Mush, a town situate about 80 miles south of Erzerum. Then returning to Erzerum, these families sought re-admission into the Russian Empire, and travelling by way of Kars to the frontier, they carried cholera into that town. Both in Mush and in Kars, but few cases of the disease occurred, and during the winter it apparently died out altogether in Armenia.

Caucasia, 1865-67.

Cholera was imported into Caucasia by a body of Greek emigrants coming from Trebizond, one of whom, the first case recorded, was attacked at the fort of Novorossiisk on the $\frac{28\text{ July}}{9\text{ August}}$. The day following a non-commissioned officer was attacked on board a Russian schooner, anchored in the roadstead.* During the next four days nine fatal cases of cholera occurred in the fort.

On the $\frac{6}{18}$th August, a sailor was attacked with cholera on board the Russian corvette "Yastreb," which had arrived off Sukhum from Novorossiisk. The day following another case occurred on board. This case was sent into the hospital of Sukhum. There the disease spread to other patients, and cases also occurred in the town.

On the $\frac{12}{24}$th August cholera appeared in the hospital at Poti, and extending along the valley of the Rion, it broke out at Kutais on the $\frac{19}{31}$ August. At this time the works of the Poti-Tiflis Railway were in progress, and the men engaged upon them were encamped in various parts of the valley. The disease attacked these encampments and clung to them with great tenacity. In Kutais the disease prevailed until October, when it apparently ceased; but in the month of November, when a large number of peasants from the neighbouring districts, especially from Kulamey, had congregated in the town on the occasion of the promulgation of the Emperor's edict, relating to the liberation of serfs, cholera reappeared, and was dispersed in the surrounding country by the returning peasants. The disease persisted in Kulamey and Gori until December, but in neither place nor in Suram, which was also infected, were the cases numerous.

On the $\frac{25\text{ August}}{6\text{ September}}$ cholera appeared in Tiflis. The persons first attacked were a Frenchman and his wife, who journeying by way of Poti and Kutais, where cholera existed at the time, reached Tiflis on the $\frac{23\text{ August}}{4\text{ September}}$. From the $\frac{25\text{ August}}{6\text{ September}}$ to the $\frac{1}{13}$th November there were 353 cases, of which 116 were fatal, in this city. On the $\frac{16}{28}$th September there was a second importation of cholera into Tiflis. Certain battalions of the army of reserve, which had marched to Tiflis by the military road, reached the city with cholera in the ranks. Among these troops 221 cases and 118 deaths occurred.

On the $\frac{1}{13}$th October cholera appeared in Erivan, and during the same month it broke out at Nakitchevan, and in the district of Elizabethpol. In Erivan the first case occurred among the military, and the disease is believed to have been introduced by two detachments of troops coming from Tiflis; but both in this town and in Nakitchevan there was a

* By an unfortunate misprint these dates of the cases are given in the report of the International Sanitary Conference of 1866, ("Sur la Marche," &c.), as the 28th and 29th *June* instead of the 28th and 29th *July* (*O.S.*), and the error is complicated by the fact of the Old Style being retained without reference to the fact. The account of the introduction of cholera into Caucasia, and of its subsequent extension there, is derived from the report referred to and from Dr. Arkhangelsky's work.

probability of infection, it would appear, from Persia. From the $\frac{1}{12}$th September to the $\frac{5}{17}$th December, there were 392 seizures and 100 deaths from cholera among the civil population, and 118 cases and 35 deaths among the military. The disease extended into the districts of Novo-Bayazid and Eckmiadzine, and there, as also at Nakitchevan, it prevailed with much severity.

In November, cholera ceased at Tiflis, and a month later, according to information communicated to the International Sanitary Conference, 1866, by Dr. Bykow, one of the Russian delegates, it disappeared from Caucasia, "sans avoir laissé nulle part, à ce qu'il parait des traces de foyer secondaire."

The following year (1866) cholera, however, again appeared in Caucasia, but very little seems to be known of its prevalence there at this time. Dr. Arkhangelsky merely says: "Speaking generally, the "manifestation of cholera in Caucasia was weak. In the government of "Stavropol the number of cases was 1,273; the number of deaths, 403; "on the coast of the Black Sea, in the Kuban district, the number of "cases was 1,421, of deaths 295. The numerical data for other districts "of Caucasia are not known, but according to Dr. Rouchevsky the "number of persons attacked was small in comparison with former years "of prevalence."

Dr. Arkhangelsky does not refer to the prevalence of cholera in Caucasia in 1867, but the disease was present in at least one locality. On the $\frac{2}{14}$th August it broke out at Hassav-Yourt, in the district of the Terek, and from that date to the $\frac{1}{13}$th September it attacked 481 persons, of whom 210 died.* (*See* Maps II.–IV.)

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* *Transactions of the Imperial Medical Society of the Caucasus*, 1867. The following is an extract from Dr. Kozlovsky's article, entitled "Cholera in the Fort of Hassav Yourt (province of Ter) in 1867."

"Cholera visited the fort Hassav-Yourt in the beginning of August 1867. The first case of cholera known to us at Hassav-Yourt was that of a military student Ivan Fedorovsky, aged 15, who, on the way between the fort Cheer-Yourt and Hassav-Yourt, ate some raw berries, and drank a great deal of water. On his entering the military hospital here we found in him all the symptoms of cholera. He recovered on the $\frac{1}{13}$ September. From that date, the $\frac{2}{14}$ of August, soldiers of the marching battalions were received daily at the hospital, and their number gradually increased. In a week we began to consider the cholera fully developed. The following table gives a list of the patients in the cholera-ward at Hassav-Yourt for the first seven days of its existence.

—	In the hospital.	Received.	Cured.	Left.	Deaths.	Remain.
Old Style.						
2nd August - -	0	4	—	—	—	4
3rd „ - -	4	49	—	—	—	53
4th „ - -	53	43	—	—	1	95
5th „ - -	95	86	—	1	4	176
6th „ - -	176	59	—	2	5	228
7th „ - -	228	63	—	—	19	272
8th „ - -	272	31	26	—	25	252

"Cholera at Hassav-Yourt did not in any way differ from the known epidemics which I had to watch in 1847 and 1848 in the town of Kiev, in 1855 at Kars, (in Asiatic Turkey), in 1857 in the fort of Grozni (in the Caucasus), or from the epidemic of last year (1866) at Tiflis and many places of the Transcaucasian country.

"We must consider that the cholera is brought here (to Hassav-Yourt) by the marching battalions. We had no cholera here last year, notwithstanding that it appeared in Caucasus and in the Transcaucasian country, and reached Tiflis, because the communications between Hassav-Yourt and the above countries are rare.

The appearance in the Leeward Islands, 1865.

Guadeloupe.

The Diffusion to the West Indies and North America.

While the eastward diffusion from Europe to Asia Minor and Caucasia was in progress, a westward diffusion across the Atlantic to the Leeward Islands and the American Continent began.

The Leeward Islands.—Guadeloupe.—Cholera appeared here on the 22nd October 1865, in the town and port of Point-à-Pitre. The history of the first occurrences of the disease, with reference to the question of introduction from without, was not inquired into at the time; the local authority maintaining that the malady was a form of paludal fever ("une fièvre paludienne, la fièvre pernicieuse algide")* of local origin, and withholding information necessary for an accurate examination of the question. On the 9th October, a sailing ship, the "Virginie," 36 days out from Marseille, had arrived at Point-à-Pitre and begun to discharge her cargo. She carried no passengers, and the health of the crew, numbering 12 to 15 men, had not suffered, it is stated, any disturbance during the voyage. The ship had left Marseille on the 3rd September, when cholera was prevalent there, and it was at first suggested that she had in some way been the carrier of the disease.

Another source of communication has been suggested by Dr. Pellarin, a retired medical officer of the French Marine, who witnessed the outbreak, and who made such investigation of its early history as was possible under the difficulties raised by the local government. He has published the results of his researches in a work of great interest relating to the medical topography of Guadeloupe and the hygiene of tropical countries†. According to Dr. Pellarin the person first attacked at Point-à-Pitre was a negro, a rope-dancer by occupation. He was attacked during the evening of the 22nd October while engaged in a public performance, and died in the course of the night. It was reported that shortly before his seizure he had visited twice, if not more frequently, a ship, the "Sainte Maire," which, bound for Mexico, had put into Point-à-Pitre on the 20th October, 36 days out from Bordeaux, where, at the close of summer, there had been some extension of the

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" The following table shows the number of cholera patients in the fort Hassav-Yourt during 42 days.

In the hospital.	Received.	Cured.	Left or transported.	Dead.	Remain.
August 2nd to the 9th - - 0	335	26	3	54	252
„ 9th–16th - - 252	63	22	2	94	107
„ 16th–23rd - - 197	47	81	3	40	120
„ 23rd–30th - - 120	14	41	8	10	75
„ 30th—Sept. 6th - - 75	16	27	4	5	55
September 6th–13th - - 55	6	33	4	7	17
Total during 43 days - -	481	230	24	210	17

" From these cases we have to deduct several having merely diarrhœa, thus limiting the real cholera cases to 357; of these only 147 recovered, *i.e.*, 41·2 per cent.; the number of deaths is 210, *i.e.*, 5·88 per cent."

* Reply of the Governor of Guadeloupe to an inquiry of the Lieutenant-Governor of Dominica, dated 5th Nov. 1865.

† *Hygiène des Pays Chauds.—Contagion du Choléra demontrée par l'Épidémie de la Gaudeloupe. Conditions Hygiéniques de l'Emigration dans les Pays Chauds et de la Colonisation de ces Pays.* Par A. Pellarin, M.D., Médicin principal de la Marine en retraite. Paris, 1872.

epidemic of cholera then prevailing in many parts of France. This ship had lost one of her crew at sea on the 9th October from an undefined illness of twenty-two days' duration, as stated by the master. The negro returning from one of his visits to the ship carried with him a packet of dirty linen, for the purpose of being cleansed, to a washerwoman named Scolastique. She was attacked with cholera on the 25th October and died the same day. On the 25th, also, a negro lad, 12 years old, who had visited the rope-dancer more than once during his short illness, was attacked and died in seven or eight hours. Then four washerwomen, associates with Scolastique, and working with her in the same wash-house, were attacked in quick succession, one on the 27th October, one on the 28th, the third on the 31st, and the fourth at the beginning of November, and all died. The washerwoman attacked on the 27th October was the fourth person who suffered from the disease. But from the date of her seizure other cases, as well as those of the three other washer-women, began to occur quickly in the neighbourhood where she worked and lived, including relations and friends of those persons who had already been attacked with the disease. Cholera spread throughout Guadeloupe and did not cease until the month of April 1866, the last death being recorded on the 16th in the commune of Moule. During the six months of its prevalence it caused 11,957 deaths, among an estimated population of 149,407.

Dominica.—Dominica did not entirely escape, in 1865, the introduction of cholera into the Leeward Islands, but the cases which occurred there were imported, and the population of the island appears to have been unaffected. The circumstances of the introduction, as gathered from a despatch of the Lieutenant Governor, dated the 23rd April 1866, are thus related by the Medical Officer in his Ninth Report (p. 26) :— *Dominica*, 1865.

"Dominica is 22 miles from the main island of Guadeloupe, but only 15 from some of its dependencies, certain small islands called 'Marie-Galante,' and 'Les Saintes.' Up to the beginning of November 1865 the communications between these small islands and the north end of Dominica was constant, almost daily ; the markets of Marie Galante were supplied with provisions and vegetables from Dominica, and carpenters, bricklayers, and others living in Dominica went across the narrow channel to work at Marie Galante, leaving their wives and families at home. It was on the 2nd of November that a rumour reached Dominica that cholera had broken out at Point-à-Pitre, in Guadeloupe. On the 4th the Lieutenant-Governor of Dominica sent to the Governor of Guadeloupe for information; and feeling persuaded after the return of the messenger that it was an outbreak of cholera, he on the 9th declared Point-à-Pitre in quarantine. Afterwards, when news arrived that the disease was spreading through the island of Guadeloupe, the whole of the island and its dependencies were placed in quarantine. Despite this precaution, a boat from Marie Galante, filled with persons, some still healthy and some sick with cholera, succeeded in reaching Dominica. A strict guard was placed by the Lieutenant-Governor on the village at which these persons had landed, and for the future "health guards" with loaded muskets were stationed at every place round the island where landing was possible, to prevent persons from Guadeloupe from setting foot on the island. These measures of precaution were entirely successful, and, so far as I can gather from the despatch, only two persons died of cholera in Dominica, and these were two boatmen who landed from the boat mentioned above, and died on the beach, close to the village that was subsequently isolated."

The appearance in New York, 1865.

The Continent of America.—On the 10th October 1865, the "Atalanta," an English mail steamer, sailed from London, bound for New York, with a full cargo and 40 passengers, 28 cabin and 12 steerage. The next day she put into Havre, remained there one day, and received 24 additional cabin passengers and 540 steerage passengers. These persons came chiefly from Switzerland, Germany, and Eastern France. Almost all had passed through Paris on their journey to Havre, and some had stayed there several hours, others several days. At the time cholera was rapidly increasing in Paris, the month of October being the month of greatest prevalence in that city in 1865. In Havre cholera was first reported on the 18th October, and 19 deaths altogether occurred in the commune, according to the official returns. Some of the emigrants while at Havre were taken ill, and were visited and attended by Government officials. One woman died there, and Dr. Swinburne, the health officer for the port of New York, from the account of the symptoms given to him by her husband, was convinced that she had succumbed to cholera. The "Atalanta" sailed from Havre on the 12th October with a clean bill of health. On the 13th a child died from cholera on board. On the 14th, 16th, 18th, 19th, and 22nd a death from cholera occurred each day (five altogether) in one family, who, while at Havre, had stayed in the same hotel where the woman, previously referred to, had died. The ship arrived at New York on the 2nd November, when the surgeon reported 60 cases of cholera and eight deaths during the passage. The vessel was subjected to a strict quarantine, during the continuance of which 42 other cases took place and eight deaths.

Twenty days after the arrival of the "Atalanta" at New York, and eight days before this ship was released from quarantine, cholera appeared among the patients in the State Emigrant Hospital, on Ward's Island. The first person who suffered here was attacked on the 22nd of November. Other attacks followed, and from that date to the 20th December, when the disease ceased, there were 31 cases, of which 27 died. In the official report* on this outbreak no information is given as to the date of arrival of the persons attacked in New York, nor of the ships which had brought them, nor of the ports whence they had sailed. "Nearly all the cases," states Dr. George Ford, the principal physician of the hospital at the time, "occurred in the same building; nearly all were "women and children, as the building was appropriated to patients of that "class, and nearly all were labouring under acute disease or were con-"valescent from it." The appearance of cholera had been preceded by much diarrhœa and dysentery.

From the cessation of this outbreak until the 1st May 1866 no other occurrence of cholera was recorded in the city and suburbs of New York.

Ward's Island, which contains the New York State Emigrant's Refuge and Hospital, is situated 18 miles, or thereabouts, in a direct line from the quarantine anchorage in Lower Bay, where lay the "Atalanta" and the quarantine receiving and hospital ships. It appears to be quite certain that no communication could have taken place between the sick on Ward's Island and the infected crews and passengers and the sick at the quarantine station, during the 28 days that the latter were subjected to detention. Whatever the source from which the disease had originated in the Emigrant's Hospital, it could not, according to the evidence adduced, have had connexion with the "Atalanta," although the outbreak occurred not long after the arrival of that vessel.

* *Report of the Metropolitan Board of Health, New York*, 1866. Appendix M., p. 424.

Before the outbreak on Ward's Island had come to an end, another infected ship had arrived at New York, the "Mary Ann," an American barque, which had sailed from Havre on the 25th October. She reached her destination on the 12th December, and the captain reported five deaths among the crew and passengers during the passage, four from cholera.

The appearance in New York, 1866.

No other importation of cholera into New York harbour took place until the 18th April 1866 when the steamship "Virginia," 2,936 tons, arrived in the Lower Bay, with 46 passengers sick of the disease on board. This ship had sailed from Liverpool for New York, on the 4th April. She touched at Queenstown to complete her complement, and when she left that port had on board 1,033 passengers (14 cabin and 1,019 steerage), her crew consisting of 110 men. Of the steerage passengers, 220 were German, Dutch, Danes, and Swedes, the remainder Irish, English, and Scotch. On the 12th April, the eighth day after the ship had left Liverpool, a steerage passenger, named Peter Voss, coming from Groningen, in Holland, died of cholera. This man had had several days' diarrhœa before the fatal seizure occurred and the nature of his malady was recognised. He had joined the ship at Liverpool, having travelled from his home to that port, with his family, by way of Amsterdam, Rotterdam, and Hull, leaving Groningen on the 29th March. Cholera was not known to be present in any of the places through which he passed at the time of his journey, but its appearance in Rotterdam was officially recognised on the 8th April, about a week, or probably even a less time, after he had been in that city. From the 12th to the 18th April, the date of the ship's arrival at New York, 33 of the passengers and two of the crew had died of cholera, and, as already stated, 46 passengers were ill of the disease when she reached her destination. During the detention of the passengers 46 days in quarantine, 144 other cases occurred among them, making altogether 190 cases received into the hospital ship. Of these cases 72 died, the whole number of deaths, from the commencement of the vessel's voyage from Liverpool to the termination of the quarantine at New York, being 110.*

Two days after the "Virginia" had reached New York the steamship "England" arrived in the harbour. She had no cases of cholera on board at the time, nor did any cases occur among the crew and passengers during 20 days' detention in quarantine. But many cases had occurred at sea, rendering it necessary for the ship to put into Halifax, Nova Scotia, and there the disease was communicated from the ship to the shore in several instances of remarkable interest.

The steamship "England," 3,440 tons burthen, bound for New York, sailed from Liverpool on the 28th March 1866. She carried from the Mersey 16 cabin, and 791 steerage passengers, and had a crew of 122 officers and men. Touching at Queenstown on the evening of the 29th, she received on board there, in addition, 1 cabin, and 393 steerage passengers, and put to sea again as soon as the embarkation was effected. The total number of persons at that time on board the ship was 1,322. Of the passengers who joined the "England" at Liverpool 465 were emigrants from the Continent of whom the precise

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* *Report of the Commissioners of Quarantine Health and the Officer of the port of New York* (Dr. John Swinburne) for 1866. I have adopted the figures given in Table B. of this Report (p. 71). There are certain discrepancies between this Table and the text of this Report. I have adopted also the statement made in this Report respecting the number of foreigners among the passengers on board the "Virginia," namely, 220, in place of the number (465) given in a previous Report of mine, to which reference is made (p. 64).

nationality was not known. Some were German, some probably Dutch, and many, if not the greater number, had left the Continent by way of Rotterdam, where cholera soon after (8th April) was recognised in the city. On the fourth day after the ship had left Queenstown (the 2nd April), early in the morning, a German lad, eight years old, was found dead in the fore-steerage, in his mother's berth, and was believed to have died from cholera. The same day an Irishman was seized with fatal cholera. From this date to the 9th April, when the ship put into Halifax, there were 150 cases of cholera, of which 46 died, six of the fatal cases being among the crew. The sick were removed to a hulk, the seeming healthy to tents erected on an island in the harbour, but the disease continued unabated for several days, not less than 200 deaths occurring in addition to those which had happened on board. Comparing the number of passengers and crew who ultimately reached New York, or could otherwise be accounted for, with the number who were on board at the time the ship left Queenstown, 256 were missing, and this number probably represents the total mortality. The disease, it is stated, was more prevalent among the German than among the other, chiefly Irish, passengers.

Several of the emigrants escaped from quarantine and gained the mainland, but in no instance do they appear to have communicated cholera to the population. On the other hand, there were examples of such communication among persons who had direct or indirect relations with the ship or passengers. The medical officer of health for the city and port of Halifax, Dr. Slater, in the discharge of his duties, contracted cholera on the 16th April, and died after 17 hours' illness. The pilot who brought the "England" into the harbour, and an assistant, also contracted cholera, and transmitted the disease to others. Several cases of cholera, moreover, occurred apparently in connection with infected bedding from the ship. The circumstances under which the pilot and his assistant contracted the disease were of singular interest, and together with the apparent communication by infected bedding, were made the subject of special investigation by Deputy Inspector-General Barrow, the principal medical officer at the time of the forces in Halifax. I give his graphic and instructive account: —

"At break of day on the 9th of April, a pilot named Terence was in his open boat, lying off Cape Sambro, five miles north-east from Sambro Island, and about 15 miles from Halifax. An assistant named Purcell and his son were also in the same boat. Between 4 and 5 a.m. the steamship 'England' came in sight, on which Terence hailed the ship, and asked if a pilot were wanted. Hearing there was sickness on board, he did not leave his boat. A bucket was lowered over the ship's side, and in it the pilot placed some official papers, showing that he was properly licensed. The documents were not returned until the next day. A 10-fathom rope was then thrown to him, by which the boat was towed astern at some considerable distance. These details I obtained during a conversation with Purcell. He told me the boat was towed as far as the quarantine ground between George's Island and the eastern shore, which would be a distance of about 12 miles. The 'England' anchored here for an hour or two, whilst the pilots went to Cunard's Wharf for further instructions how to act. On their return to the 'England' she was again got under weigh, the pilots now keeping their boat at a still greater distance astern. They took the ship to the west of MacNab's Island (about two miles further from Halifax), where she remained anchored in the main channel until she left for New York. Here all communication between Purcell, his son, and the 'England' ceased, for after seeing the steamer anchored for the second time, they went ashore in the boat with Terence. It will be better to complete the history of the Purcells before I again refer to the incidents connected with Terence. It is proved to a certainty by the corroborative testimony of Captain Grace and others, that neither of the Purcells was at any time on board the

'England.' Purcell returned home next morning (April 10th), to Portuguese Cove, 11 miles south of Halifax, and had an attack of diarrhœa on the following day (April 11th), which gradually got worse on the 12th, 13th, and 14th. By the 15th he was greatly prostrated, and then vomiting appeared for the first time. He was always free from cramps. Two of his children (aged $5\frac{1}{2}$ and 3 years) were seized on the 15th with slight symptoms, with vomiting and debility, but quickly recovered. On the 16th April, the eldest daughter, aged 15, was attacked. She was dangeously ill, with every symptom of true Asiatic cholera, and the attack was followed by reactionary fever of a low type. Thus, four individuals were attacked out of a family of nine persons, but there were no deaths. The type of the disease was probably greatly modified by the fair sanitary condition of the house and immediate locality. I found Purcell's house to be in an airy situation, on elevated ground, that is, at least, 50 feet above the sea level. It was open to all winds. During the epidemic all the windows were kept open; the rooms were of fair size, though not lofty.

"I must now return to the history of the other pilot Terence. He left the anchorage ground of the steamship 'England' on the 9th April in the same boat as the two Purcells, and went ashore. Next day (10th April) he was employed to pilot the block ship 'Pyramus' from near the dockyard to the steamship 'England,' as the block ship was about to be made use of as a hospital for the cholera cases. He then returned to Halifax without going on board the 'England,' as he himself affirmed, and Captain Grace, who commanded the steamship, also bears out the statement. I have, in addition the evidence of the Rev. J. Carmody, that Terence on his death-bed declared he had never at any time been on board the 'England.' Terence slept that night (10th April), or rather, went to bed at a boarding house in Water Street, Halifax. While in bed he was seized with vomiting, cramps, and purging, and next morning (April 11th), got in a boat and was rowed home to Portuguese Cove (where Purcell also lived), a small fishing settlement, about 11 miles distant by sea, to the south of Halifax. In his (Terence's) case there was much collapse, but it was followed by reaction and low fever, from which he died on the 19th April, after an illness of nine days' duration.

"On the 14th April, or three days after Terence returned to his home, his daughter Elizabeth, aged five years, was seized with acute cholera at 6 a.m., and died the same evening at 9 o'clock. Next day (15th) three children were prostrated. Mary, aged three years, who slept with her father, had a severe attack, and died on the 17th, all the symptoms of Asiatic cholera having been present. Catherine, aged nine years, was dangerously ill; she recovered after consecutive fever. Susan, a year old, at one time seemed almost at the point of death, but reaction took place, and she recovered.

"Out of five children living at home, only one (a boy aged eight years) escaped an attack. He slept in a room by himself, and was out of doors all day. Mrs. Terence, to the great surprise of herself, escaped. She declared she was frequently covered with the cholera discharges from the children. When I inspected her cottage it did not appear astonishing to me that the disease should have shown more malignancy than in the house of the man Purcell. Terence's cottage was on the lowest level of the village, pretty close to the sea. The land sloped upwards, very near the back of the house, and in wet weather the surface water ran, or found its way under the flooring, where it was more or less dammed up. The rooms were small, with low ceilings, and badly ventilated.

"Nine cases appeared among the two families of greater or less severity. Two of them were so slight, that they could scarcely be called cholera; but it will be interesting to determine the probable period of incubation of the disease. I find one person suffered on the second day after exposure to contagion, two on the third day, three on the fourth, two on the fifth, and one on the sixth. The two piliots contracted the disease, strictly speaking, by means of infection, one 40 hours after exposure, the other, 52 hours after.

"No other cases appeared at Portuguese Cove, nor, in fact, anywhere in the province, with the exception of several in a family residing at Freshwater, the history of which is as follows:—

"A man named Evans, a puddler, in very indigent circumstances, his wife and two children, were living in a small cottage, not by any means in a good sanitary state, near the sea at Freshwater, which part of the town forms the

southern suburb of Halifax. A large quantity of bedding, saturated with cholera discharges, had been thrown overboard from the steamship 'England' soon after her arrival, and for many days allowed to float about the harbour. Some of it drifted ashore at Freshwater, close to Evans' abode, and a woman living in the same house declared that she had seen his children playing with it. Dr. Woodill, who afterwards attended the family, told me that Evans also stated to him that his two children had picked up and had been playing with some of the floating bedding. There is at the same time a strong suspicion that several of the family had been sleeping on an infected mattress. It is quite certain that some bedding had drifted ashore at that spot, and that Evans' children were playing close about it.

"On the 22nd April, his eldest child, a girl about two years old was seized with cholera, after having had diarrhœa for nearly a week. She was conveyed to the city hospital, and died next day. The entire family was then sent to the hospital, and kept in a state of isolation. On the 24th, two days after the seizure of the eldest child, the second, a girl aged 13 months, was prostrated. Her case was a very severe one, but she recovered. Next, the mother, aged 35, was seized on the 25th, and appeared to die from exhaustion on the 30th. No consecutive fever was apparent, but Dr. Woodill informed me that a day or two before death gangrene of the nose made its appearance. No post-mortem examination was made in either of the fatal cases. The father had diarrhœa throughout, but declared he was at all times subject to it.

"I was very anxious to find the man Evans, in order to cross-examine him as to whether any of the family did actually sleep on the infected bedding, but after being released from quarantine Evans was lost sight of, and could not be found. His house had been pulled down while the whole family were in the city hospital. The situation of the house was decidedly bad; it was close to the bridge at Freshwater, at the point where the small stream runs into the sea, and there was an extensive surface of soft, black, offensive mud in the immediate vicinity.

"The evidence of the propagation of cholera by means of fomites is exceedingly strong in the Freshwater case, although, perhaps, not quite conclusive. There were no other cases in Freshwater or in Halifax."*

The Diffusion in New York, 1866.

These slight infections of the continent of America, on the coast of Nova Scotia, do not appear to have had any after consequences. But 13 days after the arrival of the "Virginia" in New York harbour, and 11 days after the arrival of the "England," cholera appeared in the city of New York, and from the 1st May, the date of the first case, to the week ending the 24th November caused 1,210 deaths.

In this appearance of cholera, as in the appearance in the State Emigrant Hospital in Ward's Island the previous year, the source of infection could not be traced. There was no likelihood of infection having been communicated either from the "Virginia" or the "England." These ships, their passengers and their crews, were then in strict quarantine in Lower Bay, and were not released from detention, the "Virginia," ship and crew, until the 21st May, passengers, the 3rd June; the "England," ship, crew, and passengers, the 10th May. Whence, then, came the infection if not from the cases of cholera brought into the port before the appearance of the disease in the city? To this Dr. Swinburne replies, "The answer is simple. Prior to the appearance of "cholera in the city, all persons exposed to the disease, either on the "passage or in this port, were detained during a period of 22 days, while "others, among whom there had been no appearance of cholera during "the voyage, but who came from European ports, where the disease is "known to have prevailed, were mingling with their friends in New York "in the course of from 10 to 14 days from the date of their probable "exposure to cholera." † In other words, while the quarantine arrange-

* *Statistical, Sanitary, and Medical Reports: Army Medical Department*, Vol. vi., pp. 365–367.

† *Report previously referred to* (p. 79), p. 40.

ments were efficient for the weeding out of obvious cases of cholera imported into the harbour, and so diminishing the quantity of infection liable to be brought into the city, they afforded little or no protection against the introduction of unmarked but not less mischievous forms of the malady. To such introduction the outbreak on Ward's Island in 1865, and the appearance of cholera in New York in May 1866, were to be attributed. In relation to this subject Dr. Elisha Harris observes of the first case of cholera in New York in 1866.* "How it chanced that an "industrious and temperate housewife (Mrs. Jenkins), residing on the "hill-top that overlooks the southern end of Ward's Island, becomes the "first victim may never be explained so as not to admit just doubts of its "exotic origin. Yet this should be stated, namely, that there were as "strong probabilities that the grounds and privy pertaining to that "tenant house (of which she was mistress) would be contaminated by "recently-landed emigrants † as that the lodging-houses in the lower "wards would become infected. Again, in the beginning of the "previous winter, 27 persons with cholera died and were buried on "Ward's Island, within one mile from the spot where Mrs. Jenkins "died." He observes, moreover, in regard to the topographical distribution of the first 25 fatal cases of cholera in the city: "Every one "resided in, or frequented, localities that were daily traversed by "freshly-landed immigrants. This fact must not be regarded as establishing any dependence of the cholera upon such near presence of "immigrants, their foul beds and clothing, or their choleraic diarrhœas, "for, notwithstanding the fact that these good and sufficient causes of "infection were both suspected and fully anticipated, nothing has been, "or is ever likely to be, positively known regarding their relation "to outbreaks of cholera in New York. The city is too densely "crowded and the mixing of the population is too promiscuous and "utterly unnoticed and unregistered to warrant any attempt to "trace the connexion of events and acts that may have occurred daily in "the places where the cholera poison was received into the system." ‡

I do not propose to follow the further course of cholera during the

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* *Report of the Metropolitan Board of Health, New York*, 1866. Epidemic Cholera in the Metropolitan Sanitary Districts during the year 1866, p. 168 and 187.

† Writing of the early investigation of this case, and on the particular privy referred to, Dr. Elisha Harris says:—"All that was seen and all the testimony then obtained conduced to the opinion that Mrs. Jenkins died of cholera, but that possibly it might have been produced by the septic effluvia of a mass of privy manure which some weeks previously had been mixed with soil and garbage refuse; and during the week previous to her illness, had, under her superintendence, and partly by her own hands, been spread upon her garden. Indeed, it was then, and is still, deemed highly probable that the cause of that sudden and fatal illness was somehow connected with that mass of privy soil which was the accumulation from that tenant population and trampers of the open area about them the previous four months. But the evidence simply amounted to this, that Mrs. J., as mistress of the premises, had, by her personal superintendence of the distribution of that manure, been more frequently exposed to its effluvium than any other one of the 35 inhabitants of her house, and that, as they had all used a new privy several weeks, there was no reason to suppose that any one except Mrs. J. and her hired man had been directly exposed to the old privy pit" (p. 167.)

‡ During the period immediately preceding, and the continuance of, the epidemic in New York, more than 50,000 emigrants from countries on the continent of Europe in which cholera was present at the time of their emigration, were landed at the Castle Garden emigrant depôt in New York (*Report of Metropolitan Board of Health, New York*, 1866, p. 18). The total number of ships which came into the harbour having cholera on board or in the course of their voyage, during this time, was 18. These ships brought 8,501 passengers, and their crews numbered 965. There had been on board them 495 deaths from cholera at sea, and while the passengers and crews were detained in quarantine there were among them 608 cases of cholera, of which 242 died. (Dr. Swinburne's *Report*, p. 71).

diffusion of 1866, and subsequent years on the continent of America. My present purpose is limited to describing the facts relating to the communication of the disease from the Old World to the New World in 1865 and 1866.

4.—*The Diffusion to North Western Africa and to West Africa.*

North-West and West Africa, 1865-69.

Algeria, 1865-1867.

West of Egypt cholera, so far as is known, appeared first in this diffusion in Algiers. Here, on the 4th September, 1865, a soldier of the 3rd African battalion, nine days after he had left Marseille, where he had staid several days on his way from Paris to Algeria, and where cholera was then prevalent as well as in Paris, was seized with well-marked cholera. Nine days after the occurrence of this case two of a detatchment of hospital attendants, in number 262, and recently landed from Marseille,* were sent into the Dey hospital suffering from cholera. Five other cases were received into the hospital on the 15th, and others in quick succession up to a total number of 15. On the 17th September two patients in the same division of the hospital where the cases of cholera were treated were attacked with the disease, and from this date cholera spread in the wards until not less than 69 patients and attendants had been attacked before the close of the month. During the same period, in addition to the 15 cases from the detachment of hospital attendants, but seven other cases had been received into the hospital, soldiers whose relation to previous seizures was not determined, but some of whom had probably been on duty in the hospital guard. On the 26th September, the wife of a military-bed maker, living in a house adjoining the quarters occupied by the detachment of hospital attendants, when cholera appeared among them, was attacked with fatal cholera. This was the first case among the civil population. The disease now began to extend both among the civil population and the garrison, and it continued in the city for four months.

I have not been able to find any account of the probable loss of life from cholera in Algiers during this outbreak. The disease appears to have been general in the city, and it probably extended thence to the neighbouring province. It is not, however, until 1867 that I have information as to the further progress of cholera in Algeria. In that year the disease was present in every province of the country, and it is reported to have been very fatal among the Arab tribes. At the close of October it had ceased in the province of Algiers, but it was still prevalent, although decreasing, in the provinces of Oran and Constantine. The last-named province had been re-infected at several places on the sea-coast and on its eastern frontier, from Tunis, towards the close of July or at the beginning of August; and there can be little doubt that cholera was transmitted from the province of Oran to Morocco during the year. It is greatly to be regretted that no official account of the prevalence of cholera in Algeria during the years 1865, 1866, and 1867 should have been published.†

* I take the facts relating to this appearance of cholera in Algiers from the work of Drs. Vincent and Collardot, *Le Choléra d'après les neuf Épidémies qui ont régne à Alger depuis* 1835, *jusqu'en* 1865. (Paris, 1867.) The date of arrival of the detachment of hospital attendants in Algiers is not stated, but it is said that the disease appeared among the men after an incubation of from 15 to 20 days. In calculating the probable period of incubation of the case received into the hospital on the 4th September, Drs. Vincent and Collardot include eight days stay at Marseille, making the period in this case 17 days.

† It was stated in some of the French medical journals at the close of 1867, but without the source of information being given, that the loss of life from cholera in Algeria that year was estimated at 80,000.

Early in 1867 cholera appeared in the Regency of Tunis at a time of dearth. The disease was first certainly noted on an estate called Enseir Zeriba, near the city of Tunis, where a contraband trade was known to be maintained with Sicily; and it was supposed to have been imported from that island where cholera had been introduced the previous year, and where it prevailed with pestilential severity in the year under consideration. But as all quarantine restrictions upon shipping had been removed since the summer of 1866, and Tunis was in free communication with other places which were afterwards known to be infected, it was impossible to discover the actual source of the infection, or, indeed, to say when it may have been introduced into the Regency.

Tunis, 1867.

Cholera was probably present in the city of Tunis in March, and in April there was no longer question of its existence there. A sharp outbreak of the disease appears to have occurred at the beginning of April, extending into May, and then seemingly coming to an end for a short time. The malady reappeared a little later, and assumed formidable proportions in July. The deaths during the latter month were, it is believed, from 300 to 400 daily.

In May, two bodies of troops left the city, one for the northern, the other for the southern districts of the Regency, to collect the annual impost. These troops carried the disease with them, and suffering considerable losses from it themselves, infected the various towns and districts they visited. Thus, in the northern districts, Bizerta, Beja, Keff, and the neighbouring districts were in succession infected; and in the southern districts Susa and Sfax, and the towns in the Jerid (Belad-el-Jerid, "the country of date palms"). In the sea port towns and other of the larger centres of population the disease was very severe, and the dissemination in the track of the troops, and from the different centres of infection set up by them, appears to have been general. Towards the close of July, or at the beginning of August, cholera had reached and passed the Algerian frontier at two points, one on the limits of the Sahara region in the Jerid, where little could be known of the further movements of the disease; the other in the district of Keff, by which route it reached Biskra, in the province of Constantine. On the sea-coast, moreover, it was transmitted from Tunisian ports to Bona and Phillipville, in the same province.*

Morocco, 1868.

While this infection of Algeria from Tunis was in progress on the eastern frontier, cholera being already widely prevalent in that country, it is highly probable that across the western frontier the disease was spreading into Morocco. There does not seem, however, to be any definite information of the prevalence of the disease in the latter country until its appearance in Tangiers at the beginning of February, 1868, and its subsequent occurrence in all the important seaport towns on the Atlantic coast. From the time of its appearance in Tangiers to the date of the latest information regarding it, early in August, the disease seems to have been prevalent along the whole coast-line of Morocco, and in the districts adjacent. Of the districts east of Tangiers it is only known that Tetuan and the towns of that district were reported free from cholera at the close of July or commencement of August. Of the districts west of Tangiers it is known that the disease appeared on the coast at Arzilla, El Araish (Larache), Sallee, Robat, Dar el Beida, Mazagan, Saffi, and Mogador. In the district of Mogador the

* *Intorno al Cholera di Tunisi dell' anno* 1867, per Dottor Giovanni Ferrini; Milano, 1868.

disease continued until late in October. This general infection of the seaport towns of Morocco, does not appear to have been, except to a limited extent, a dissemination from port to port. So far as the meagre facts relating to the distribution of the disease admit of an interpretation, they would seem to indicate a propagation of the disease to the coast from the interior, and in continuation of the diffusion of cholera in the province of Oran (Algeria) the previous year.

In some sort tending to confirm this inference, as indicating the presence of cholera in a very active form in the remoter districts of Morocco about the middle of 1868, and of which no knowledge reached Her Majesty's representatives on the coast at the time, is the remarkable fact I have now to relate of the transmission of cholera from Morocco across the Sahara to Senegambia.

Senegambia, 1868-69.

Early in November cholera, until that time, so far as my present information extends, unknown in Senegambia, broke out at Podor, on the River Senegal, following upon the arrival of a caravan from Morocco. Podor is a large town situated 150 miles from the sea coast, or thereabouts, and is the principal centre of the considerable trade carried on between the native towns on the Senegal and Morocco, with which country it maintains constant communications by land.* From Podor the disease spread both up and down the river. Of its upward progress nothing is known but the fact. In its downward progress cholera was observed first at the mouth of the river, at St. Louis, and afterwards at Richard Toll and Dagana, lying on the stream between Podor and St. Louis. At Saint Louis the disease appeared towards the close of November, and from the 1st to the 15th December, there were at least 1,800 deaths among a population of 12,000.

At the time of the outbreak in Saint Louis, there were many natives there from the Joloff country, lying between the rivers Senegal and Gambia, and Mandingoes from the Upper Gambia, the latter having fled to St. Louis in consequence of an attack upon their tribe by a neighbouring tribe. When cholera broke out in St. Louis, these natives fled into the Joloff country, carrying with them the disease and communicating it to the numerous populous villages which exist in the western portion. Here it was propagated from village to village, being heard of at Nyanee, on the border of the Mandingoe country, in February 1869.

On the 10th March 1869 cholera appeared in MacCarthy's Island, on the River Gambia, at the beginning of the ground nut season, when the natives were flocking to it from the mainland, for work in the ground nut harvest. MacCarthy's Island is situated 180 miles from Bathurst, up the river, and has an ordinary population of from 300 to 400, under the supervision of an English agent, of whom 80 died of the disease. On the appearance of cholera in the island, the native labourers from the mainland, and many families, fled, some up stream and some down stream. By the fugitives up stream the disease was carried into the Bondou country lying between the upper waters of the Gambia and the Senegal; by the fugitives down stream it was carried to Doomasangsang, a trading

* When the appearance of cholera in Senegambia, at Podor first became known in England, I had an opportunity of conversing with the late Mr. Winwood Reade on the subject. Mr. Reade had shortly before visited Podor. He told me that from what he had himself observed of the relations maintained between Podor and Morocco, and what he had learned of the caravan routes commonly followed across the Sahara to the Senegal, he saw no improbability in the transmission of the disease by caravans, and the infection of the villages on the routes. The Sahara is, in fact, much more populous in the part of it traversed by these routes than is commonly understood.

station, 100 miles below MacCarthy's Island, which it nearly depopulated. From Doomasangsang cholera was propagated to Bathurst where the first case was observed on the 4th May 1869, in the person of a negro woman who had arrived a few hours before from Doomasangsang. Other cases may have occurred in Bathurst before, as several dead bodies of negroes had been found in the streets about this time, the cause of whose death was not in the first instance determined, and who had very probably been landed ill in the night from canoes coming from up-stream. When later the Coroner directed a post-mortem examination of a corpse thus discovered, and having no external marks of injury, the intestines were found filled with the "rice-water" discharge characteristic of cholera. In Bathurst, during the months of May and June 1869 among a population (civil) numbering at the beginning of the outbreak 4,250 there were 1,174 deaths from cholera registered; 12 deaths occurring among the troops (coloured, 101 strong), 3 among their families, and 2 among the European residents.

Senegambia, 1868-69.

After the appearance of cholera at Bathurst, the disease broke out at Albreda, a trading station nineteen miles up the Gambia, which to that time had escaped; and on the coast at Dakar, Cape de Verde peninsula, about midway between Bathurst and St. Louis. In both these instances the disease is stated to have been transmitted from Bathurst. From Dakar cholera passed to the neighbouring town of Rufisque, and from Rufisque to the adjacent island and town of Goree, where the disease appeared in June.

Bulama and the Rio Grande, 1869.

South of Bathurst cholera was next heard of, in September, at Cacheo (at the mouth of the river of that name), at Bulama, the easternmost of the Bissagos islands (where there were 30 deaths from the 10th September to the 18th October), at Bissao and other places on the adjacent mainland, at the mouth of the Rio Grande, and finally on the banks of that river, where, at the time of the latest news received of its progress (October 1869), the disease was making its way into the interior.

In this the first reputed extension of cholera in West Africa, the disease does not appear to have been disseminated lower south than the Rio Grande. (*See* Maps II.–VI.)

5.—*The Diffusion in Egypt, Nubia, and East Africa.*

Egypt, Nubia, and Eastern Africa, 1865-71.

Egypt, 1865.

I have in preceding sections described the diffusion of cholera from Alexandria, as the starting point, in 1865, northwards to Europe, and the secondary diffusions from Europe the same year, eastwards to parts of Asia Minor and Caucasia, westwards to the continent of America, and southwards to North Africa, west of the original starting point. I have further described as briefly as is consistent with such clearness as the facts in my possession admit of, the succession of events following upon the original diffusion, except in the western hemisphere, so as to show their relationship to that diffusion. I now, having completed the account of the diffusion northwards and westwards as far as I had proposed, return to the starting point of the diffusion in Lower Egypt, and proceed to a description of the other lines of diffusion followed by the disease, also in 1865, contemporaneously with the diffusion northwards and westwards. While cholera was being disseminated from Alexandria on the northern and western coasts of the Mediterranean, it was also being disseminated on the eastern coast, whence through Syria it passed into Mesopotamia. Moreover, at the same time, the disease was spreading from more than one point throughout Lower Egypt, and travelling along the valley of the Nile directly southwards, beginning

in all likelihood a journey either there, or, as will be seen, more probably from Suakin, of which the end was not reached six years afterwards, when the malady having extended through East Africa to Quilimane, in Mozambique, was last heard of spreading into the interior of South Africa.

And first of this southern diffusion, and the prevalence of the disease in Egypt.

Egypt, 1865.

On the 21st May 1865, the captain of the ship which brought the first detachment of pilgrims returning from the Hejaz by way of Suez, and his wife, were attacked with cholera in Suez, the second day after the arrival of the ship there (19th May). The next day (the 22nd May) a case of cholera was observed at Damanhur, on the line of railway from Suez to Alexandria, among a body of pilgrims who had come from the former port. On the 2nd June, a case of cholera occurred among the inhabitants of Alexandria who were in communication with the pilgrims having other destinations, and who were waiting for embarkation; and on the 11th June, the existence of cholera in the city was officially recognized. On the 17th June, the disease appeared at Cairo, first at the railway station among persons coming from Suez. In no previous epidemic had cholera manifested itself in Alexandria before Cairo. An explanation of this difference is to be sought in the changed conditions of transit between the two cities and Suez since the epidemic of 1855. By the establishment of railway communication in the interval, it became possible to hasten the passage through Egypt to Alexandria of those pilgrims who simply traversed the country for other destinations in the basin of the Mediterranean. This was effected by trains specially detailed for the purpose, and thus the chances of infection of Alexandria were indefinitely multiplied as compared with Cairo and other intermediate towns.

From the several points mentioned, and others, cholera spread over Lower Egypt, and prevailed there until the month of September. During this period the total ascertained deaths in this division of the country numbered 43,287.

In Middle Egypt the disease appeared in the province of Minieh on the 30th of June 1865, and during a prevalence of three months or thereabouts, it caused in the three provinces of this division of the country 3,846 deaths.

Upper Egypt was invaded by cholera from the Hejaz by way of Kosseir about the same time as Lower Egypt; and it probably was also infected later from Middle Egypt along the Nile valley. In the province of Keneh the disease appeared on the 23rd July; the dates of appearance in the other provinces do not seem to have been ascertained. The total recorded mortality from cholera in Upper Egypt was 14,059, of which 713 occurred in the provinces of Kosseir and Esneh.

The population of Egypt on the 26th May 1865 was 4,841,677; the total reported mortality from cholera during the year was 61,192. (See *Appendix*, Table XXVI.)

Of the further movement of cholera up the Nile valley, beyond the frontier of Egypt, nothing is known; and of its prevalence in Nubia, but three isolated facts have come to light. These three facts, however, are of great importance in the history of the progress of the epidemic southwards. The first is the presence of cholera in Suakin in the month of June 1865; the second, the serious prevalence of cholera in Cassala, the capital of the province of Taka, from July to October 1865; the third, the presence of cholera in a grave form in the province of Taka in March 1866.

ubia, 1865.

The fact of the prevalence of cholera at Cassala in July–October 1865, was ascertained by Mr. Rassam, when he passed through Cassala, early

in November 1865, on his mission to Abyssinia.* Cassala is situated on the Abyssinian frontier, and is the principal military station of Egypt in Nubia. Its communications with Egypt are maintained through the port of Suakin, and the dates of prevalence of cholera in Cassala indicate that Suakin would be the starting point of the diffusion in this portion of the Khedive's dominions. The fact relating to the occurrence of cholera in the province of Taka in 1866, was reported to the Egyptian General Board of Health by H. E. Djaffer Pasha, the Governor General of Nubia.† He states that on the 29th March 1866, the Bedouins of the Beni-Amer Arab tribe, then encamped on the borders of a great lake, were surprised by a violent storm. One hundred men, women, and children were killed outright; and many animals, including six elephants and two hippopotamuses. The trees overlooking the lake were blasted, and the stones upon the banks appeared as if calcined. The next day cholera broke out in the tribe, and killed in a very short time ("en quelques moments") from 500 to 600 persons, the disease disappearing as suddenly as it appeared.

Abyssinia, 1865-1866,

Early in October cholera appeared in the town and island of Massowah, on the Abyssinian coast, and extended to the adjoining district on the mainland. The disease had become very fatal when Mr. Rassam left Massowah on his Abyssinian mission on the 16th October.‡ Of the source of the outbreak there is no information, but it followed in succession upon the outbreak in Nubia, and was no doubt a continuation of the diffusion in that country along the districts bounding the Red Sea to the south. Mr. Rassam, in the narrative of his mission, furnishes incidentally the explanation of the escape of Massowah from the primary diffusion of cholera from the Hejaz in 1865. Under date the 2nd June 1865, Mr. Rassam being then at Massowah, he notes:—
"News arrived that no less than 15 out of 30 persons who had gone to
"Mecca from Massowah had been carried off by cholera, which had
"broken out among the Hajj."§ It would appear then that the number of pilgrims who visited Mecca from Massowah in the pilgrimage of that year was small; and as the principal thoroughfare for Mahommedan pilgrims from Abyssinia and Eastern Nigritia is by way of the port of Suakin, the liability of Massowah to infection would be considerably less than the liability of the first-named port, and of Kosseir.‖

Of the subsequent progress of cholera in Abyssinia, there is only such knowledge as was acquired by the Abyssinian captives, and Mr. Rassam's mission, one of the members of which was Dr. Blanc.

During the stay of the mission, first as visitors, afterwards as captives, at Zagé, on the southern shore of Lake Tzana, March–April 1866, Dr. Blanc learned that cholera had been "making havoc" in Tigré, the district lying between the coast of the Red Sea, at Massowah, and Central Abyssinia, where the mission then was, and that the disease had

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* *Further Correspondence respecting the British Captives in Abyssinia.* Presented to Parliament, August 10th, 1866, p. 6. Mr. Rassam to Lieut.-Col. Merewether, Metemah, 27th November 1865.

† Procès-Verbaux, 1865–66, p. 212.

‡ Narrative of the British Mission to Theodore, King of Abyssinia, vol. I., ch. IV.

§ Narrative, vol. I., p. 78.

‖ I have no means of knowing the actual number of pilgrims and other passengers travelling by way of Massowah to Jidda in 1865; but, in 1866, from the 18th March to the 2nd June, 12 ships entered Jidda harbour from Massowah, carrying 147 passengers, and in addition an Ottoman frigate with 415 soldiers. During the same period there arrived at Jidda from Suakin 37 ships, carrying 1,613 passengers, and from Kosseir 13 ships, carrying 1,123 passengers.

Abyssinia, 1865-66.

extended to other districts.* This prevalence in Tigré and extension towards the interior was clearly a continuation of the outbreak which the mission had witnessed on the coast at Massowah in the previous year, and probably also of direct infection propagated across the Nubian frontier. The members of the mission, therefore, with this knowledge of a previous southward diffusion of cholera in the northern districts of Abyssinia, were not surprised when, at the end of May 1866,† cholera appeared at King Theodore's camp at Zagé, and subsequently became prevalent on the south-eastern shore of the lake, and in the district intervening between the lake and Debra Tabor to the east. The disease continued in the King's camp for "several weeks,"‡ and was especially fatal when the camp, in June, was fixed at Kourata, on the eastern shore of the lake.§ The captives and the camp were at Gaffat in July, and cholera broke out there in that month.

Nothing is known of the progress of cholera south of Lake Tzana, or in other localities than those occupied by King Theodore's camp at the time in question. The epidemic then manifested no abatement of diffusiveness, and it is to be inferred that the populations south of Lake Tzana would suffer from it equally with those to the north. Positive knowledge ceases with the information derived from the captives.

East Africa, 1869-71.

From the period when cholera was prevalent on the borders of Lake Tzana in 1866 to the year 1869, cholera was not heard of in East Africa.

In October 1869, towards the close of the month, it was rumoured in Zanzibar that caravans trading from that island in the districts beyond the Wamasai, on the mainland, had been attacked with a deadly

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* *The Story of the Captives.* A Narrative of the Events of Mr. Rassam's Mission to Abyssinia. By Dr. Blanc, one of the captives, 1868, p. 65.

† Mr, Rassam, "Narrative," vol. ii., p. 123.

‡ *Story of the Captives*, p. 67.

§ "On the 6th of June, his Majesty [King Theodore] left Zagay with his army; Mr. Rassam and the other prisoners accompanied him, all the heavy baggage had been sent by boat to Kourata. On the 9th, his Majesty encamped on a low promontory south of Kourata. Cholera had by this time broken out in the camp, and hundreds were dying daily. In the hope of improving the sanitary condition of the army the Emperor moved his camp to some high ground, a mile or so north of the town, but the epidemic continued to rage with great virulence, both in the camp and in the town. The church was so completely choked up with dead bodies that no more could be admitted, and the adjoining streets offered the sad sight of countless corpses surrounded by their sorrowful relatives, awaiting for days and nights the hallowed grave in the now crowded cemetery. Small-pox and typhus fever also made their appearance, and claimed the victims cholera had spared. On the 12th June we received orders to join the camp, as his Majesty intended to leave on the following day for the higher and more healthy province of Begemder. On the 13th, at early morning, the camp was struck, and we encamped in the evening on the banks of the Gumara, a tributary of the Nile. The next day the march was resumed. We had been more or less amending since our departure from Kourata and Outva (a beautiful plateau). Our halting place of the 14th must have been several thousand feet higher than the lake, nevertheless, cholera, small-pox, and typhus fever continued unabated. His Majesty inquired what was usually done in our country under similar circumstances. We advised him to proceed at once to the higher plateau of Begemder, to leave his sick on the side of Debra Tabor, and to break up as far as possible his army, and distribute it over the whole province, selecting a few healthy and isolated localities where every fresh case that broke out should be sent. His Majesty acted upon this advice, and before long had the satisfaction of seeing the several epidemics lose their virulence, and before several weeks, disappear altogether."—Dr. Blanc, "*Story of the Captives*," pp. 66–67.

"[*Kourata.*] . . . The 9th June [1866], the King sent to say that about one thousand of his soldiers and camp followers had been attacked during the night by cholera, of whom about 300 had died already."—Mr. Rassam, *Narrative*, vol. ii., p. 128.

disease. This disease was stated to be then fatally prevalent in the Usambara country, and to have made its way to the coast towns of Tanga and Pangani, coming from the interior. The news was speedily confirmed, and any doubt which might have existed as to the nature of the malady was dissipated by the appearance of cholera, on the 27th October 1869, if not a few days earlier, in Zanzibar, believed to have been imported from Pangani, with which port the island was in daily communication.

The Wamasai occupy a district lying midway between the Victoria Nyanza lake and the sea coast, beyond the first great range of mountains, of which Kilimanjaro is chief. The Usambara country lies near to the coast in rear of the Wadigo district, which has a coast-line extending from the town and port of Tanga on the north, to the town and port of Pangani on the south. Beyond the Wamasai country, east to the position of the Victoria Nyanza, and north into the Gallas country, south of Abyssinia, our knowledge of localities is imperfect, and rests upon information derived from the leaders of caravans. Dr. Christie has made the source of the cholera which appeared in East Africa in 1869 a subject of particular investigation, and his researches leave no doubt that the disease came from the interior to the sea coast, opposite Pemba Island. The following is the account he gives of the result of his inquiries at the time :—

"The country occupied by the Wamasai lies to the west of Usambara, and is represented in the maps of Africa by a blank. Little is known of the people themselves and still less of their country, as it has never been visited by Europeans, and we depend for our information regarding them on passers through the country, the boundaries to the north, south, and west being entirely unknown. The Wamasai are a pastoral people; they have no villages and move about from one district to another, according to the season, to find pasturage for their flocks. In manners and customs, and probably in origin also, they are closely allied to the Mavite who inhabit the country to the north-west of Lake Nyassa. They are represented as being an exceedingly fierce and warlike tribe, the terror of all their neighbours, and during times of scarcity they make raids on the coast towns, devastating the country in their line of march, and carrying with them all the cattle. A few years ago they harried the country between their own territory and Mombassa, and even threatened the town. To say that the Wamasai are out is sufficient to strike terror to the hearts of all their neighbours and make them fly from their line of march.

"Pangani and Tanga are situated a little to the north of the island of Zanzibar, and are the starting points for caravans proceeding to the interior towards the Victoria N'Yanza and further to the north. These caravans skirt the Usambara country in their course, and pass through the territory of the Wamasai, the larger caravans paying the usual black-mail levied, and the smaller exchanging commodities and then returning to the coast towns.* . . . . "I had an opportunity of examining lately two men who were leaders of the caravan which penetrated the Masai country, and brought to the coast the first intelligence of the existence of the epidemic in the interior. Their narrative was one of great interest in many respects, and they seemed to be thoroughly acquainted with the territories described. One had made fifteen caravan journeys amongst the Masai and the other nine.

"The caravan left Pangani in November 1868, with over 1,000 men, and proceeded towards the interior, keeping the River Pangani, or Rufu, as it is called, higher up on the left. On the fourteenth day of marching they reached the Lake Jipe, and on the sixteenth day the town Urombo, near Mount Kilimanjaro, and on the twentieth Marago ya Kanga, the first Masai town. On the forty-ninth day, they reached the Masai encampment at Kisima in the the district of Laikepya, in the fifth month after their departure from the coast. There are many delays in travelling, and sometimes a caravan remains for more than a week in one place without moving. When at Kisima they were told that

* *Transactions of the Epidemiological Society of London*, vol. iii., p. 268.

the Masai had made a raid on the Somali to the north, and that while in their country they were attacked with some deadly disease which they brought with them to their own country, but they had no name for it, and had never known it before. At Kisima the party which had reached the district separated in all directions to trade with the Masai, and, after being absent for about a month, they reunited and started on their return journey. One of their party died at Kisima, but they did not suspect it was cholera as it did not spread. On their return they made a detour, and kept Kilimanjaro to their left. On the seventh month they reached the town of Lytoketoke, not far from Kilimanjaro, and there they saw for the first time people dying of the plague or cholera. Formerly it was merely a matter of report, but when they saw those affected they knew at once the nature of the disease, and hastened towards the coast. Lytoketoke is six days from Harush, and when they reached that place they met a large caravan from Pangani going towards the Masai country. This caravan was told that the whole district was affected with cholera, and advised to return; but, not attending to this advice, the caravan pushed on, but altered their line, not passing in that of the returning caravan which reached the coast in safety, only one of their number having died. I have every reason to believe that the statement of these men is correct, as I had several opportunities of checking their distances. The town of Kisima must be considerably to the north of the equator. They said that they never went into the country of the Somali or Gallas, but that they had met traders from Brava who regularly trade in these districts. Their description of the countries through which they passed and the rivers crossed was of great interest, but foreign to the present inquiry.

"Another man, one who was with the caravan met on its inward journey, was examined previously, but not by myself personally. I regret this, as he was one of the few survivors who reached the coast, but I hope to be able hereafter to get hold of him.

"He stated that on the fifteenth day from Pangani, they arrived at Harush, where a portion remained to trade in the district; that the remainder passed on to Dasikera, where another portion remained, and that, as ivory was very dear and scarce, the remainder pushed on to the district of Laikepya, where the great body of the Masai were. When there, they knew that the Masai were dying in great numbers, and as those of the expedition were also attacked, they collected their ivory and goods, and, having concealed the greater part in a hole which they dug, fled to the coast. On their return they passed through the districts of Dasikera and Harush, but the whole of the trading party in these two places died. After their arrival at the coast cholera appeared, and it appeared also in all the districts through which they passed. Out of about 150 of the party that started from the frontier of the Masai district only seven reached the coast alive.

"This man stated that when in Laikepya he heard that the Masai had made an attack on the Soma-Gurra tribe, who possess camels, horses, and cattle, and that they had brought the disease to their own country. He also said that the next tribe to the Soma-Gurra was the Galla Borani, whose territory is on the south of the Jub river. This brings us very near to the line of the cholera epidemic of 1865, stretching from Berbera to Gananah and Barderah, but beyond the district of the Soma-Gurra I have not been able to trace it. Investigations, however, from the direction of Brava have been set set on foot, as trading parties from that place visit Soma-Gurra, the distance being under a month. If the disease did not start from Berbera, it probably proceeded from Abyssinia, which is very likely; or from some place on the west coast, crossing at about Gondokoro. But conjecture is useless. I have requested several people about to start shortly for the Masai country to collect further information, both as to its origin and also regarding its devastations among the people."*

At the time when Dr. Christie wrote the foregoing paragraphs he was unaware of the prevalence of cholera in Central Abyssinia in the summer of 1866, and of the general movement of the disease from north to south in that country, along the route from Massowah to Enarea in the Galla country; and he had put aside, as incredible, a positive statement made by the Somalis, at the commencement of his investigations,

* Transactions of the Epidemiological Society, vol. 3, p. 283.

that the disease in the Masai country, and the district beyond, had come from Mecca through Abyssinia and the Galla country. Enarea, according to Mr. Plowden, is "the great emporium" of East Africa. This town "is frequented," he states, "by traders from Zanzibar and "Tajoora, from Massowah and Khartoom, from Darfoor and Khoor-"doofan, and it is said even from Darsala and Timbuctoo."* Direct communication is not maintained between Zanzibar and Enarea, but an indirect intercourse is kept up through the intermedium of the tribes on the borders of the Galla country, as the Soma-Gurra, and Galla Borani tribes referred to. Dr. Christie, with later information, has since examined, with special reference to the time occupied in the passage of caravans, and the difficulties they have to encounter in the route, the question of the possible transmission of cholera from Central Abyssinia in 1866, through the Galla country to the East Coast of Africa. As the result of an elaborate investigation he has come to the conclusion that, assuming the onward movement of cholera to have continued from Central Abyssinia, infecting the Galla country, and spreading along the different trade routes from Enarea, the disease could not have appeared on the East Coast earlier than 1869. In other words, he finds that the time of appearance of cholera on that coast, in that year, is consistent with the assumption that it was a continuation of the diffusion which, starting from Nubia in 1865—or more accurately from Mecca, by way of Suakin—had been last observed extending southwards in Central Abyssinia, in the summer of 1866; is consistent, in fact, with the statement of the Somalis.

That which happened with the caravans travelling eastwards to the coast from the Wamasai country in 1869, happened also with the caravans travelling westwards to Lake Tanganyika. Dr. Christie has ascertained that the same year the caravans returning from the Wamasai along the route to Unyanyembe and Ujiji, carried cholera along with them infecting the different stations through which they passed, including the towns mentioned. Along this route he has been able to trace the disease back as far as Tura and Kerewe, the former a halting station a little east of Unyanyembe, and the latter the place of meeting of the Arab traders who visit the regions to the south-east of the Victoria-Nyanza. He further shows that the different references to cholera this year (1869) in Dr. Livingstone's "Last Journals," indicate that the disease was propagated to Bambarre west of, and to Cazembe south of Lake Tanganyika; as also to the plateau of Labisa, west of Lake Nyassa.

As already stated cholera had appeared in Zanzibar at the close of October 1869. Here it spread throughout the town and island, and did not cease until the middle of July 1870. The visitation was terrible. It is estimated that the loss of life from the disease in the town was not less than 15,000, and throughout the island generally 25,000. Of the different races forming the population of the town and island, it is believed that there were destroyed by the pestilence $6\frac{1}{2}$ per cent. of the natives of India, 10 per cent. of the Arabs, and 25 per cent. of the negroes.†

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* *Correspondence respecting Abyssinia*, 1846–1848. Parliamentary Report, p. 7 and p. 112.

† "In 1835 Dr. Ruschenberger estimated the census of Zanzibar at 12,000 souls, "of whom two-thirds were slaves. In 1844 Dr. Krapf proposed 100,000 as the "population of the island, the greater number living in the capital. Captain "Guillain, in 1846, gave 20,000 to 25,000, slaves included. I assumed the "number, in 1857, as 25,000, which during the north-east monsoon, when a large "floating population flocks in, may rise to 40,000 and even to 45,000. The Consular "report for 1849 asserts it to be 'about 60,000.'"—Capt. R. F. Burton, *Zanzibar*, vol. I., p. 81.

I quote Dr. Christie's account of the further progress of the disease on the East African Coast:—

"On the arrival of the natives from the northern ports, I collected information regarding the spread of the epidemic to the north. It passed along the coast generally, attacking the inhabitants of all the towns in communication with Zanzibar. When direct communication with Lamoo was open on the change of the monsoon, the epidemic reappeared with greater violence than formerly when it first reached that place from Melinda. It lasted four months, and the only section of the population not attacked was the Indian. It also appeared at Mukdesha and Worsheikh, and affected the population of the maritime districts to a distance of from two to three or four days from the coast. It appears reasonable to suppose that it did not pass further inland in the districts to the north, simply because at that place the trade routes were closed, and the people residing in the several districts, belonging to distinct tribes, have no intercourse with their neighbours. The people from the inland tribes generally bring their produce to Brava, Merka, Mukdesha, and other places before the dhows leave for Zanzibar, and they return with their purchases at once. The produce that they bring consists of hides, ivory, and gums such as myrrh and arabic, but principally the two former; orchella weed and gum copal being a coast produce. The ivory and slave caravans starting from between Quiloa and the Pangani go at all seasons, and consequently those starting from infected districts carried the disease with them along their line of march. This epidemic reached to the north as far as the island of Socotra. The Socotra dhows leave Zanzibar very early, at the first break of the monsoon, and generally call at Mombassa, the whole passage being about 15 days. My Socotra friends state that in one of their dhows one man died on the passage, and that, on arrival at its destination, the disease broke out at Bunder Kadu, near to the principal town, Bunder Kalassia. It did not spread generally throughout the island, and there were only about 20 deaths at Bunder Kadu. They spoke of a former epidemic which was very fatal at Bunder Kalassia, and which I supposed to be that of 1858–59.

"The time has not yet arrived for the collection of full particulars regarding the spread of the epidemic to the south of Zanibar, so that the remarks to be made are incomplete, and some may require correction. The disease lingered in Mozambique and the neighbourhood for about eight months. On January 11th, 1871, it appeared at Ibo, to the north of Mozambique, and at about the same time at Quilimane to the south, being conveyed in both cases in dhows from the infected Mozambique district.

"My informant, the principal banyan merchant at Ibo, states positively that cholera did not reach that place by coast traffic, but by dhows. It lasted for a month and a half, and there were about 1,300 deaths, but no natives of India were attacked. Five of the higher class of Portuguese died, and 12 Portuguese soldiers. At the time of his departure from Ibo, about the beginning of May, no cases had occurred for about a month, the last case that he heard of being on the 11th of March, and he had heard that the epidemic had passed towards the interior to about five days' journey from the coast. The last case of cholera at Mozambique was in the month of March last.

"Native merchants from Nosi-bé inform me that cholera appeared at Majunga, on the north-west coast of Madagascar, in August 1870, and that it was conveyed in native craft from Mozambique. It was communicated from Majunga to the French island, Nossi-bé, in September. The disease was there confined to the native town, Ambanourou, around which a *cordon militaire* was placed. The epidemic did not spread at the time. During this epidemic there were about 160 deaths. In March 1871 cholera again appeared at Nossi-bé at the time of the arrival of the Seychelles mail, and three men on board the mail steamer died. I have heard nothing regarding the mode of communication. The disease was confined entirely to the French town of Helleville; not many deaths had occurred, and a cordon was placed round the town.

"In December 1870 a quarantine of 14 days, afterwards of 21 days, was established at Mauritius, as the north coast of Madagascar was infected, and as cases, supposed to be sporadic, had occurred in Mauritius. In January 1871 it is reported from the same island that several cases had occurred, usually fatal, and fearing that the malady had been conveyed from Madagascar, a petition had been presented to Government, praying that communication between Mada-

gascar and Mauritius may be 'entirely prohibited' until the latter island may be free of cholera."* (*See* Appendix, Note D.)

For detailed information as to the progress of this epidemic in East Africa I would refer to Dr. Christie's forthcoming work. His account of the early origin and progress of the epidemic is a unique example of the application of geographical research in the elucidation of an etiological question.

Not to interrupt the continuous history of the diffusion of cholera southwards in East Africa from 1865 to 1871, I have, for the moment, left unnoticed a reappearance of cholera in the Hejaz and Lower Egypt in 1866.

Egypt, 1866.

Early in the year there were some indications that the outbreak of 1865 had not wholly come to an end with the close of that year. On the 8th March 1866, an Italian workman, who had recently come from Chalouf, on the Isthmus of Suez, died in the European Hospital, Alexandria, of cholera, certified to be "Asiatic cholera," by a commission of the General Board of Health. A commission of the Board was also sent to Chalouf, to investigate the state of things there. No cholera was found in that place, but a fatal form of diarrhœa; and the commission recommended the closure of the workshops of the Isthmus Canal Company, at Chalouf, for a period. On the 23rd of March a death from cholera occurred on board the ship "Trent," in the harbour of Alexandria; on the 28th a case of cholera was admitted into the Deaconesses Hospital, in the same city; and on the 27th–28th a case occurred in Suez. These three cases were regarded as sporadic. Three so-called sporadic cases were also reported to the General Board of Health in April. One of these occurred in Alexandria on the 3rd of April, one on the 17th (a fatal case on board the French steamer "Mœris," in the harbour), and the third (also a fatal case), on the 26th April at Suez. Diarrhœa still continued during this month in Chalouf. At the close of May the attention of the Board was arrested by an unusual mortality reported from Suez. The deaths ordinarily occurring in that town, during this month, numbered on the average from 14 to 16. But at the meeting of the Board on the 30th, not less than 33 were reported; and among these three rapidly fatal cases occurring respectively on the 26th, 27th, and 28th of the month, of a choleraic disease, designated by the Board's sanitary agent at Suez, Dr. Anton Flora, as "*fièvre pernicieuse, cholériforme.*"† Four other fatal cases of this disease were reported by

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* *Transactions of the Epidemiological Society of London.* Vol. 3, p. 285.

† The following is extracted from Dr. Flora's Reports to the Egyptian General Board of Health at the time. (Procès-Verbaux, 1865–66, pp. 146–147) :—

Suez, 26e Mai 1866.—"(1 heure après-midi.)—Aujourd'hui 26 Mai, vers une heure de l'après-midi on m'a appelé pour me rendre auprès d'une blanchisseuse Syrienne qu'on m'a dit avoir été subitément saisie d'un froid extrême.

"J'ai trouvé une femme de quarante-cinq à cinquante ans; les yeux étaient enfoncés très-profondément dans les orbites, les joues avaient pris une couleur jaunâtre et étaient contractées, les lèvres, la langue, les bras, les jambes étaient froids. Le ventre était contracté.

"Il y avait des vomissements aussitôt qu'on faisait avaler quelque boisson à la malade.

"Le pouls était extrêmement faible, mais néanmoins d'une fréquence normale.

"Il existait des douleurs très-fortes aux reins et au ventre, telles que la malade poussait des plaintes continuelles. Ma première impression a été qu'il s'agissait de douleurs rhumatismales. [In a subsequent description of this case (*see* below) taken from his note-book, Dr. Flora states that his first impression was that the disease was cholera.]

"3 heures.—La malade devient de plus en plus froide. Le pouls n'est presque

Dr. Flora before the 5th of June, and a fifth case occurred on that day. On the 30th May a case of cholera occurred in Alexandria, which ended fatally on the 2nd June; and on the 9th a doubtful case occurred in Suez. On the 7th July a fatal case of cholera occurred in Suez, and on the 8th and 11th, 4 cases, 2 fatal, in Alexandria. At the beginning of August "cholerine" was reported prevalent in Mogaloff, and probably existed in Tantah and Cairo; while a series of rapid and unexplained deaths occurred among the workmen at Toussoum on the Isthmus of Suez Canal. Mogaloff is a village of 300 population, situated near Zagazig, and 23 deaths from "cholerine" were reported there in three days. In September any doubt as to the true character of these occurrences of "cholera" and "cholerine" was set at rest, as far as Alexandria was concerned, by a considerable outbreak of cholera, in its epidemic

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plus sensible à la radiale; le cœur ne bat que faiblement (50 pulsations par minute), les vomissements ont cessé, mais la diarrhée continue.

"6 heures.—Continuation des douleurs. La faiblesse augmente.

"8 heures.—La malade expire.

"Réunis en consultation avec les docteurs Papatheodoro et Murad Effendi, nous avons été d'accord d'attributer la cause du décès à un cas de fièvre pernicieuse, d'origine rhumatismale.

"9 heures.—Je viens d'être appelé pour donner mes soins à un individu voisin de la défunte, et qui, comme elle, se livre au blanchissage du linge.

"Je rencontre chez cet individu les mêmes symptômes que j'avais vus sur la défunte.

"27 Mai (6 heures du matin).—Je trouve le malade en meilleur état. Il a un peu réposé pendant la nuit, et la chaleur est un peu revenue aux extrémités du corps.

"8 heures.—Le malade est encore en danger, mais enfin il vit encore. Le froid a recommencé et le pouls est presque insensible.

"Midi et demi.—Je viens d'être appelé pour visiter un jeune homme, de nationalité Grecque, agé de vingt-cinq ans environ, et qui était tombé malade depuis huit à dix heures.

"La figure était bleuâtre et froide. Les joues, les lèvres, la langue, et les bras étaient également froids. Le pouls ne battait plus du tout à la radiale. Les battements du cœur étaient faibles et lents. Les vomissements arrivaient, non spontanément, mais à la suite de toute absorption de boisson. La diarrhée ressemblait presque à de l'eau naturelle. Les crampes n'existaient pas. Le malade gisait sur son lit, inquiet et hagard, ainsi que les cholériques ont l'habitude de faire à leurs derniers moments. Il avait tout à fait l'apparence d'un cholérique en état d'asphyxie.

"2 heures.—Le malade expire.

"Le petit enfant de M. Uhlrich, député sanitaire, était en convalescence d'une fièvre qui avait duré trois jours, avec gonflement des glandes tuméfiées et entre les molaires.

"Hier matin, cet enfant était couché; puis ayant éprouvé une grande soif, il se leva et but une certaine quantité d'eau, et ensuite il descendit pour jouer dans la rue. Après midi, cet enfant offrit de graves symptômes de choléra. La face était très altérée, les yeux enfoncés, les joues rentrées, les vomissements se succédaient à chaque absorption de boisson.

"La diarrhée ressemblait à de l'eau claire.

"Le soir, la partie supérieure du corps etait glacée, à l'exception, toutefois, du front. Les pieds conservaients quelque chaleur; mais, vers minuit, ils perdirent la chaleur normale, sans toutefois devenir aussi froids que les bras et les lèvres.

'28 Mai (6 heures).—Ce matin, le petit malade va mieux, mais la langue et les levres sont toujours froides. Il n'a jamais éprouvé de crampes, mais seulement il se plaint de fortes douleurs dans les reins."

"Considérations générales.—Je reconnais que tous les malades dont je viens de parler présentent la plupart des symptômes cholériques. Ce qu'il y a seulement à observer, c'est que: 1. Il n'y a pas eu de crampes; 2. Qu'il n'y a jamais eu que les parties supérieures du corps qui soient devenues froides et aient pris une couleur bleuâtre; 3. Que les douleurs aux reins étaient toujours si fortes, qu'elles arrachaient continuellement des plaintes aux malades; 4. Que chez les décédés, les pieds ne perdirent leur chaleur qu'à la dernière heure; 5. Que les douleurs cholériques n'ont été éprouvées que par l'enfant Uhlrich; 6. On peut donc conclure de tout cela que la maladie semble avoir été causée par des impressions de froid.

form, in that town. This outbreak began on the 12th September, and it was suggested that the disease had been imported from England. The value of this suggestion will be seen presently. No complete report of this outbreak has been made, and its extent must be estimated from the following meagre details. From the 18th to the 25th of September 20 cases were reported. After this date and for a short period the cases numbered, it is believed, 60 daily. On the 11th November there was said to be a sensible decline in the prevalence of the disease, and its cessation was reported on the 20th.

The significance of the occurrences in Lower Egypt here described (and which must be regarded as indications of what was happening there at the time, not of all that happened, in regard to cholera) cannot be rightly understood until like occurrences taking place about the same period in other districts bordering upon the Red Sea have been described.

On the 19th May 1866, 20 days after the termination of the religious sacrifices, and five days after the departure of the great caravan for Egypt, other caravans having started ten days earlier, cholera was again observed in Mecca; on the 23rd in Jidda; and before the close of the month at Medina. Few details are given of these outbreaks. In Mecca the date when the presence of the disease was first recognised this year is alone known. In Jidda, a case of cholera was admitted into the military hospital on the 23rd June, and from the 25th to the 30th there were nine deaths from the disease recorded. Other cases followed, but none were reported after the 30th June. A caravan proceeding from Mecca to Medina, was attacked with cholera at Bedr, apparently about the same time that the disease appeared in Mecca. At Medina it is simply known that cholera was more or less prevalent there at the period when the different pilgrim caravans left that city on their route homewards. Every caravan of which information has been obtained was infected at the time of leaving Medina. The "Great Caravan" for Egypt, left Medina on the 2nd June, and on the route to El Wedj it had 15 deaths, 12 from cholera, three from other diseases.

"Je continue donc à regarder cette maladie comme une fièvre pernicieuse déterminée par la froid, tout en convenant qu'elle ressemble beaucoup au choléra."

Dr. Flora, in a work entitled *Ærztliche Mittheilungen aus Ægypten* (Wien, 1869), republishes, with one exception, his official reports to the Egyptian General Board of Health on this disease with additional notes. The exception refers to the report relating to the first two cases described above, and of which he states, in a foot-note, he had been unable to obtain a copy in Alexandria. For this report he substitutes the following account of the cases taken from his note book :—"Gestern Mittags "wurde ich gerufen zu einer syrischen Wäscherin, 35 Jahre alt, die plötzlich 'ganz "kalt und schwarz' geworden sei (sie hatte im englischen Hotel gewaschen, aber "nur die vollends unverdächtige Hauswäsche, nicht für Fremde). *Symptome.*—Das "Gesicht eingefallen, die Augen zurückgezogen, Zunge und Lippen kalt, so die Arme "und Beine; Bauch etwas eingezogen. Erbrechen nach jeden Trunk, nicht spontan, "wässerige Diarrhöe, Radialpuls sehr schwach, Frequenz normal; leichte Waden-"krämpfe; heftige rheumatische Rückenscherzen und fast anhaltendes Heulen. "Meine diagnose im ersten Momente war Cholera. Verlauf. Um 3 Uhr: Die "Kranke etwas kälter, Erbrechen aufgehört, Püls schwächer, langsamer, Schmerzen "geringer; um 6 Uhr: Diarrhöe und Scherzen aufgehört, aber der ganze Körper "kalt, die obere Hälfte blau; um 9 Uhr Tod. 2 Fall. Ein Wascher (Araber, 30 Jahr alt.) "erkrankte gestern 5 Uhr Abends mit den gleichen Symptomen; nach Mitternacht "begann er warm zu werden, heute scheint er mit gebessert. Ich glaube heute, dass "diese zwei Fälle eher mit dem Namen *Perniciosa choleriformis* zu bezeichnen "sind; der Verlauf wird übrigens entscheiden." (Pp. 37-38.)

Dr. Flora concludes his notes of the disease which he thus named with the following observations :—

"Vielleicht war es eine hybride Form, die noch Manches von der Epidemie des Vorjahres an sich trug, aber wie alle Hybriden, der Kraft der Fortpflanzung entbehrte. In Suez halte sie unter drei Absätzen drei Monate gedauert, in allen andern Orten nur eine bis zwei Wochen." (p. 47.)

No cases of cholera occurred after the arrival of the caravan at El Wedj and in its subsequent course to Egypt. The caravans to Yembo also carried cholera with them from Medina. An infected caravan reached Yembo on the 24th May, and from that date to the 9th June there were 335 deaths among the caravans waiting embarkation there. The Syrian caravan, numbering from 5,000 to 6,000, persons reached Damascus on the 25th June, and reported that for 12 days after leaving Medina, there had been from three to four deaths daily in the caravan. It reported also that villages near the line of march were infected with cholera. Of the caravans passing into Central Arabia, and on the northern route through Jebel Shomer, to Mesopotamia, there is no information.

These facts prove that there was a general reappearance of cholera, although probably of no great magnitude in the localities of the Hejaz which had been visited by the disease in the previous year. Viewed in relation with these occurrences there can be little question that the choleraic affections which have been described in Lower Egypt were of the same nature. During the progress of the events under consideration, the International Sanitary Conference of 1866 was sitting at Constantinople, and with reference to them Dr. Bartoletti expressed the opinion that cholera had been introduced into the Hejaz from Abyssinia. On the other hand Dr. Dickson pointed out, as inconsistent with this opinion, that the data submitted to the Conference by the Ottoman sanitary agents as to the times of appearance of cholera in the Hejaz, indicated the simultaneous manifestation of cholera in several widely separated places. It is not easy to reconcile the dates given with the theory of importation from Abyssinia, unless on the supposition that the infection must have been distributed independently to Mecca and Medina. But such concurrent infection of the two cities was possible, as many pilgrims from Western Abyssinia landing at Yembo would first visit Medina, while pilgrims from Eastern Abyssinia, landing at Jidda, would, as a rule, proceed direct to Mecca; both cities, as well as the ports of landing, being exposed to the chance of infection, assuming this to exist, about the same time. Such chance of the Hejaz receiving infection existed not only from Abyssinia, as Dr. Bartoletti suggested, but also from Nubia. Although the presence of cholera in Massowah in 1866 was not recognised until June, there can hardly be a doubt from Dr. Blanc's statement,* that early in that year, the disease had been widely prevalent in the adjacent district of Tigré. From the 9th March to the 2nd June 1866, 562 passengers from Massowah were landed at Jidda from 13 ships. Of these passengers 415 were soldiers, and of the remainder the greater number it is to be inferred were pilgrims. Some of these would come from the interior of Abyssinia, and notwithstanding that a fortnight or three weeks' voyage would as a rule intervene between the time of their embarkation at Massowah and landing at Jidda, still there were certain possibilities of infection being carried by them which may not be ignored. The troops were landed from an Egyptian frigate on the 23rd of May, the day when the first case of cholera was admitted into the military hospital at Jidda, but the disease had been recognised in Mecca four days before this date. The chance of infection from Nubia was much greater than that from Abyssinia. No less than 1,613 passengers had been landed from 37 ships at Jidda, from Suakin, almost without exception pilgrims, during the same period in which the 147 passengers, exclusive of soldiers, had been landed from Massowah. Of the number of pilgrims landed at Yembo from Suakin during this period there is no information. The greater number of these pilgrims

* *Story of the Captives*, p. 65.

would be Takruris from Western Abyssinia, and other negro Mahommedans from more western countries, and in journeying to Suakin they would traverse the province of Taka, where as already described cholera was present in March 1866. Such were the known chances of infection of the Hejaz from Nubia and Abyssinia.

Egypt and the Hejaz, 1866.

Lower Egypt was also exposed to infection from Abyssinia and Nubia, contemporaneously with the Hejaz, by the direct communication which is maintained through the port of Suez with Suakin and Massowah; it was, moreover, liable to infection from the Hejaz. Irrespective of the ordinary traffic with the Hejaz, there were landed at Suez, from the 7th to the 16th May, 5,066 pilgrims returning homewards. The first case of the choleraic malady described by Dr. Flora occurred on the 26th May. Cholera was not recognised in Mecca, or any part of the Hejaz until the 19th May, three days after the arrival at Suez of the last of the pilgrims mentioned, all of whom were reported in excellent health. This would appear to exclude any connection between the return of the pilgrims, at least, and the subsequent appearances of cholera in Lower Egypt. The occurrences of 1865, however, show how little faith is to be reposed upon the reports received at this period, either by the Ottoman or the Egyptian General Board of Health, regarding the sanitary condition of Mecca and of the pilgrims.

I confine myself to stating the facts so far as they are known. Both in the Hejaz and in Lower Egypt there was a wide re-appearance of cholera in 1866, dating from an early period of the year. The dates are too imperfect to admit of any definite conclusion as to the part, if any, which re-infection from Abyssinia and Nubia may have played in the phenomenon, but the possibility that such re-infection may have taken place is not to be overlooked in considering it.

In reference to this subject the relation of the re-appearance of cholera in Lower Egypt, in 1866, to cholera in England that year, suggests certain considerations of great interest. I have already shown that the prevalence of cholera in England, in 1866, was not a consequence of recrudescence of the disease imported the previous year, but of a series of re-infections from the Continent, the following instance only excepted. The re-appearance of cholera at Southampton, in July and August 1866, was the result of re-introduction of the disease by one of the Peninsular and Oriental Steam-Navigation Company's ships, the "Poonah." This ship arrived at Alexandria, from Marseille, on the 26th May 1866 (the second visit she had made to the port that month), and after 40 hours' stay she sailed for Southampton, on the 28th May, reaching her destination on the 10th June. Cases of cholera, some fatal, had been reported in Alexandria in March and April; and a case, which ended fatally, was reported on the 30th May, two days after the "Poonah's" departure for England. On the 26th–28th May, cholera was certainly present in Suez. These facts supply the link missing in Professor Parkes's elaborate investigation of the Southampton outbreak in 1866 and, it appears to me, that they complete the investigation. (*See* Maps II.–IX.)

6.—*The Diffusion to Syria and Western Anatolia.*

Syria and Western Anatolia, 1865.

I have now to describe the diffusion to the east coast of the Mediterranean, and thus complete the account of direct dissemination of cholera from Egypt in 1865.

The disease appeared at Smyrna on the 24th (? 16th) June, at Larnaka, Cyprus, on the 26th June (in the lazaretto; in the town, 7th July), at Beyrout on the 29th June (in the lazaretto; in the town, 1st July),

and at Dardanelles (in the lazaretto), and also at Jaffa on the 1st July. The appearance in each of these instances it is desirable to narrate.

Smyrna.—The first reported case of cholera in this town occurred during the nights of the 24th and 25th June, but there were fatal cases of choleraic disease on the 16th and 19th June, and the epidemic most probably began here at the former date. The following was the succession of known cases until the 6th of July, after which period the disease became widely prevalent in the town. On the 16th June a boy, 14 years of age, living in the washerwomen's khan, was seized in the course of the evening with vomiting and purging, rapidly became algide, and died during the night. On the 19th June, a girl 12 years of age, living in the same khan, was carried to the Greek hospital suffering with symptoms similar to those observed in the boy, and died after a few hours illness. During the night of the 24th–25th June, a woman, M. M., living close to the Imamglou khan, which communicates with the washerwomen's khan, was attacked with manifest cholera, and died 14 hours after the first appearance of diarrhœa. On the 28th June a woman, C. H. P., who had been in attendance upon M. M. during her illness, was attacked and died 13 hours after the first observed symptom. In the course of the night of the 2nd–3rd July, the husband of M. M. was seized with cholera, and he died the following morning. The same night a sister-in-law of M. M., who had assisted, not only during her illness, but also during the illness of C. H. P., was seized and died on the 4th. On the 4th July, moreover, a son of M. M., who had fled to the town of Guez-Tépe, after the death of his father and mother, was attacked with the disease, but he recovered. The same day a dervish, who on the 24th June, according to Mahomedan usage, had washed the body of a Turk who had died on that day in the lazaretto, and was subsequently detained in quarantine there 10 days, was attacked with cholera the morning after his release, and died after a few hours illness. A woman also died this day from cholera at Fassoula, who had been in communication with the families of both M. M. and C. H. P. On the 5th two new cases occurred, one being a boatman who had communication both with the lazaretto and with vessels quarantined in the bay; the other a cousin of the woman who had died at Fassoula. On the 6th July the wife of the boatman before mentioned was attacked with cholera. The three cases last mentioned all died. Other cases also occurred on the 6th, but it is not necessary to follow them in detail.

While these events were occurring numerous fugitives were arriving from Alexandria at Smyrna. When rumours of cholera in Alexandria first reached Smyrna, early in the month, a quarantine of five days duration was imposed on arrivals from that port, but as this period of time was made to include the length of the voyage also, the detention in quarantine rarely exceeded a few hours. On the 23rd June the Austrian Lloyds' steam vessel, the "Archduchess Charlotte," landed 293 passengers at the lazaretto, one of whom was seized with cholera during the following night, and died on the 29th. A second case occurred among them on the 24th, which ended fatally the same day, and three other cases on the 25th and 26th. On the occurrence of the first of these cases, five additional days quarantine was imposed upon the passengers, else they would have been liberated on the 24th. These were the earliest cases of cholera observed in quarantine.

From the 23rd June to the 5th December 1865, 1,172 deaths from cholera were registered at the sanitary office in Smyrna. The International Sanitary Conference, 1866, estimated the number of deaths during the outbreak in this town at 2,500, and the attacks at 5,500, among a population of 100,000, reduced by emigration during the progress of the epidemic to 70,000 or 60,000.

From Smyrna the disease spread into the neighbouring district. Burnabat, a large village of 910 houses, and having an estimated population of 10,000, was attacked on the 8th July, and from that date to the 31st, 110 attacks and 72 deaths occurred. The disease also spread to a nomadic tribe, the Furaks, then encamped near the villiage. Other places which suffered from the epidemic, some more some less, were Boudja, Kassaba, Menemen, Choroskioi, Echelle-neuve, Tyrra, Denisli, Sarakeuï, Ortoxe, &c. The nomadic tribes of Fundukly and Hazziar, encamped, during the spread of the epidemic from Smyrna, between Adala and Alacheïr, were also attacked.*

Cyprus.—From the 26th June to the 13th July, 19 cases of cholera were landed from various ships at the lazaretto of Larnica, beginning on the first-mentioned date, when the sole source of infection was Alexandria. The lazaretto of Larnica is a vast stone building close to the city. On the 6th July a child, three days after entering the lazaretto, was attacked with cholera and died in the evening. The next day, the 7th July, two persons were attacked in the lazaretto, one the mother of the child before mentioned, the other a young man who had been under detention nine days. The former recovered, the latter died after five hours illness. The same day the first case happened in the city, the person attacked being the keeper of a lodging-house, where many persons going out of quarantine had lodged. The disease next spread in the city, and extended to Nicosia and other parts of the island. In Larnica (population 12,000, reduced to 4,000 by emigration during the epidemic) there were 363 deaths from cholera. The deaths from the disease in the island were estimated to number 652.

Cyprus, 1865.

Beyrout.—On the 29th June, a Jewess died of cholera in the lazaretto. This was the first case recorded at Beyrout. She had landed on the 24th June from the Austrian steam ship "Archduke Maximilian," coming from Alexandria. Three cases of cholera, one fatal, had occurred on board this ship during the voyage. On the 1st July a case of cholera was observed in the city, the patient being a person who had no relations with the lazaretto. Before this date numerous travellers from Alexandria, fugitives and others, had flocked into Beyrout, having first been subjected to a detention in quarantine of from five to ten days. Among the passengers were many poor pilgrims, sent homewards at the expense of the Egyptian Government. At Beyrout, moreover, the caravan of Persian pilgrims journeying homewards through Syria and Mesopotamia disembarked. The date of disembarkation is not stated.

Beyrout, 1865.

Following quickly upon the death of the Jewess, on the 29th June, the quarantine guard engaged in burying the body was attacked with cholera and died. Another fatal case occurred in the lazaretto on the 1st July, and a guard, specially detailed to the service of the family in which the case occurred, was attacked on the 3rd July and also died. Next the Abbé Viale, secretary of Monseigneur Valerga, the patriarch of Jerusalem, who had landed at the same time as the Jewess from the "Archduke Maximilian," died of the disease. He had been freed from detention and left the lazaretto on the 3rd July. He was attacked the same day in the city and died during the night. Another guard was also seized and died. Altogether, 30 cases of cholera, of which 15 died, occurred in the lazaretto, where there had been subjected to detention from the first news of cholera in Alexandria to the 25th July, 3,600 persons, of whom 400 were pilgrims coming from that city. During

* See as to details of the outbreak at Smyrna, "*Mode d'Invasion et de Propagation du Choléra étudié à Smyrne.* Par le Dr. D. Chasseaud. Constantinople, 1871.

the same period eight of the ships entering the port from Alexandria (in all 50) had reported 18 cases of cholera, and 11 deaths from the disease, during the voyage.

The lazaretto at Beyrout, to the east of the city, is described at the time as isolated and well ventilated, but not admitting of a proper separation of the sick from the healthy, and too small to accommodate the sudden influx of travellers from Alexandria. To relieve the overcrowding, it was supplemented by several isolated houses and an hotel situated on the opposite side of the city.

In the city the disease, after its appearance on the 1st July, prevailed for three months, and attacked 1,500 persons, causing 493 deaths,* the population being estimated at 75,000.

Dardanelles, 1865.

Dardanelles.—Here, as at Beyrout, the first cases were observed in the lazaretto, but, unlike Beyrout, the connexion between the cases in the lazaretto and the earliest cases in the town was clearly traced. Two cases of cholera, the earliest observed, occurred in the lazaretto on the 1st July. The persons attacked had been disembarked from an Egyptian ship, the "Tantah," which had arrived at Dardanelles, from Alexandria, on the 29th June. On the 12th July a soldier of the lazaretto guard was attacked with cholera and sent to the military hospital in the town, where he was placed in a ward with other patients suffering from ordinary maladies. From this date to the 14th three cases occurred in different parts of the town. The first was a boatman, who daily conveyed the quarantine physician to and from the lazaretto. The second was a dealer in eatables, who pursued his industry in the vicinity of the lazaretto. The third was a guard who had been detained 10 days in the lazaretto, and who, two days after his release, was taken ill of cholera and died in the town. Other persons attacked with the disease attached to, or in communication with, the lazaretto, were the deputy-keeper and two guards of the interior service, one of whom died. The number of persons detained in quarantine from the 29th June to the 1st August, was 2,269, and among these 16 cases of cholera occurred before disembarkation, and six after, the deaths numbering 15. In the town the disease continued until the 30th August, causing, among a population of 8,000 (less 2,000 fugitives), 369 deaths, 27 among the garrison.

Jaffa, 1865.

Jaffa.—The following account of the appearance of cholera at Jaffa was given at the close of the outbreak, by Dr. Philip of that town, in a report communicated to Her Majesty's Consul there.

The earliest appearance of the epidemic occurred on the 1st July. On that day a small Greek vessel arrived in the port from Alexandria. The same day the captain was seized with vomiting, diarrhœa, cramps, and blueness of skin, and died a few hours afterwards. The next day a Greek, in one of the crowded houses of Jaffa, was seized in a similar fashion and died the day following. Other individuals were attacked with like symptoms prior to the 4th July, and all died. None of the cases to this date had come under the observation of a medical man. After the 4th July the epidemic spread from house to house, and from street to street. At the beginning of the epidemic the population of Jaffa was estimated at 25,000, but during its progress the greater number fled from the town, many encamping in the gardens near the town, and in the plain; others seeking refuge from the disease in the neigh-

* I have followed in this account of cholera at Beyrout the statement given by the International Sanitary Conference, 1866 (*Rapport sur la Marche*, &c., p. 18), but in respect to prevalence in the city, H.M. Consul-General, in a despatch dated 21st Oct. 1865, states that the epidemic had continued until that month, and that the mortality was estimated from 1,700 to 2,000.

bouring towns and villages and in Jerusalem. At the close of the epidemic not more than 4,000 persons are believed to have remained in the town. From the 1st July to the 8th August 1865, about 3,000 cases of cholera are estimated to have occurred, the ascertained deaths numbering 580. When the disease ceased in the town it existed in some of the villages of the adjacent plain.

Alexandretta, Kara Aghash, &c.

It is necessary to add to the foregoing details that two deaths from cholera occurred on the 10th July, in the quarantine station at *Alexandretta*, and that 14 deaths from the same disease happened on board the Turkish frigate "Medjidié," at anchor off that port, at a date not stated. Alexandretta was in frequent communication both with Alexandria and Constantinople, but cholera did not appear in the town until after it had broken out at *Kara Aghash*, a large village on the coast, about three miles distant from Alexandretta, where the disease was first observed about the beginning of August. It was supposed at the time that this village had been infected from the "Medjidié."

El Arich, 1865.

While the diffusion to the coast towns of Syria above described had been in progress, cholera had spread along the principal road from Lower Egypt to the southern frontier of Syria at *El Arich*. Here the disease appeared on the 5th July, and caused from this date to the 26th September, 83 deaths.

From the starting points described on the Syrian coast cholera spread into the interior. A general narrative is alone possible from the accessible accounts of this dissemination. These, however, are sufficiently clear to admit of a tolerably accurate conception of the progress of the disease. Syria was entirely without cholera, when, in the course of June and at the beginning of July 1865, the malady began to be freely scattered from Alexandria on its coast. As soon as the epidemic had shown itself in the different seaport towns a remarkable exodus of the populations commenced under the terror of the pestilence, and the same phenomenon was observed in perhaps every town and village where the disease penetrated. In Jaffa five-sixths of the estimated population of 25,000 fled from the town; in Beyrout, two-thirds of the estimated population of 75,000. The fugitives sought refuge for the most part in the neighbouring towns and districts, and carried with them the infection of the disease. To these fugitives, rather than to the pilgrims returning from Mecca, is to be attributed the most important part in disseminating the disease in Syria, and, as will presently be seen, in certain districts beyond that country.

The interior of Syria, 1865.

Gaza, *Ramleh*, *Nablus*, and *Jerusalem* were all attacked with cholera after the flight of the population of Jaffa. In Jerusalem the disease appeared at the latter end of July and continued until the middle of November, causing 912 deaths.* Nablus is estimated to have lost 2,000 of its 8,000 inhabitants, by cholera, prior to the 23rd August.

A stream of fugitives from Alexandria had flown into Beyrout from the beginning of the epidemic in the former city; and in like manner, when the epidemic began in Beyrout very many of the population fled into the neighbouring country, and especially towards and to Damascus, and to the towns in the north, Homs, Hama, &c. Preceding or accom-

* The Report of the International Sanitary Conference, 1866 (*Sur la Marche*, &c.), states that cholera first appeared at Jerusalem on the 21st September 1865 (p. 18). I have adopted the data given in a report made by Dr. Mazaraky, Physician to the Russian hospital at Jerusalem, a copy of which was courteously furnished to Her Majesty's Consul there.

panying these fugitives were the pilgrims returning from Mecca, by way of Beyrout. Of the progress of cholera on the different routes little is known. In Damascus the disease appeared on the 1st August, in the Turkish quarter. The Syrian caravan from Mecca had entered Damascus on the 17th July, having been reported free from cholera during the forty days journey across the desert. Its arrival had been preceded by pilgrims who had travelled homeward by way of Beyrout, The city was in free communication with Beyrout, where the disease had appeared on the 29th of June; and in it many of the fugitives from that port took refuge. The Turkish quarter in which the disease appeared first in Damascus, is a place of sojourn for pilgrims who simply halt in the city; but the chances of infection from Beyrout were numerous, and the particular source of infection was not discovered at the time. Cholera prevailed in Damascus from the 1st August to the close of September or beginning of October, the estimated mortality from the disease within that period being 3,000.

North of Beyrout cholera appeared at Homs and Hama on the route to Aleppo; and in Aleppo it was first observed on the 11th August. Before this date the disease had broken out at *Kara Agash*, as already mentioned, on the coast near Alexandretta. It has been sought to show that Aleppo was infected by the Persian caravan of pilgrims returning from Mecca by way of Beyrout. This caravan did not reach Aleppo and enter the city until the 16th August, when, according to a despatch of Mr. Consul Skene, dated the 22nd August, cholera had certainly been present in the city five days. Aleppo, at the time when cholera appeared in the city, had been exposed to infection from the towns south of it and also from the coast in the vicinity of Alexandretta. Whichever the source of infection, the disease here was frightfully virulent. According to the International Sanitary Conference, 1866, it killed in the space of three months, among a population reduced from 120,000 to 90,000, by flight, 7,000 persons. But Mr. Consul Skene states, writing under date the 16th October 1865, that the deaths were computed to number 10,300.

Thirty thousand persons, it is believed, fled from the city to avoid the pestilence, the majority, there is little doubt, flying to the north towards and into the valley of the Euphrates, cholera being prevalent on the routes both to the south and the west. The probable consequences of this exodus will form the subject of a separate section (Section 7).

The interior of Anatolia, 1865.

I have already described what is known of the dissemination of the disease in the district adjacent to Smyrna. I have no information whether any dissemination took place from Dardanelles into the neighbouring district; and have knowledge only of one other outbreak in Western Anatolia, namely, in the district of Brusa. Cholera broke out in the city of Brusa in August, and caused, during this month and the month of September, 300 deaths. It appeared also at several places on the Lake of Abullonia, and at the two principal ports of the district on the Sea of Marmora, Ghio (Gemlik), and Mudania. Nothing seems to have been ascertained of the relations of the outbreak at Brusa to the appearances of cholera on the sea-coast of Marmora.

At the close of 1865, cholera appears to have died out in Syria and Western Anatolia, except perhaps in the former country at Tiberias. Here it was rumoured that the disease was present both in November and December. But in 1866 there was an outbreak at Tiberias, which began on the 24th May and ended on the 6th June, causing 54 deaths in a population of about 3,000. This year also cholera reappeared to some extent in Aleppo, in September and October, and cases were observed also in Tarsus and Adana.

Syria, 1866.

7.—The Diffusion in Mesopotamia, Kurdistan, and Persia.

I have already traced the progress of cholera in 1865 from Mecca across Central into Eastern Arabia, its diffusion upon both shores of the Persian Gulf, its appearance at the head of the Gulf in Basra, at the close of August, and its presence in Koweit and Mohammera early in September. From Basra and Mohammera cholera spread among the populations on both banks of the Shat-el-Arab, until the confluence of the Euphrates and Tigris was reached, when the upward progress of the disease was limited to the course of the former river. When cholera broke out on the Shat-el-Arab, the Arab tribes frequenting the banks of the Tigris moved into the interior, leaving the district bordering the river a desert. But the Euphrates, the great thoroughfare from the head of the Gulf for pilgrims bound for Nedjef and Kerbella, and at this time being traversed by the Persian pilgrims returning homewards along this route from Mecca, has numerous fixed populations on its banks. Following the line of the Euphrates, cholera appeared in succession at Kurna (the town at the confluence of the river with the Tigris), at Suk-e-Sheyuk, and at Samava. From the latter town, the disease, keeping strictly to the lines of communication on the river and between the different towns, pursued two routes. It was carried along the western branch of the river (the pilgrims' route) and across the Sea of Nedjef to Nedjef, and subsequently it appeared at Kerbella. It was also carried along the main course of the river-stream and appeared first at Diwanieh, then at Hillah.* Here the route of the pilgrims returning from Kerbella and Nedjef by way of Bagdad crosses the Euphrates, and on the 17th September a case of cholera, the first recognised, occurred in Bagdad, three weeks after the appearance of the disease at Basra. Eight days passed without other cases being observed when on the 25th September four cases were reported, removing any doubt which might have existed regarding the infection of the city.

In the course of September the great Arab tribe of Aneyzah, inhabiting the Syrian desert, contracted cholera, but whether from Kerbella or from Nedjef, or from infected tribes further south, is unknown.

The precise dates of the appearance of cholera in the several places attacked, in its course from Basra along the Euphrates to Bagdad, do not appear to have been ascertained, but all accessible information concurs in the order of appearance stated. The loss of life reported during the prevalence of the disease this year in some of these places was as follows:†—Diwanieh, 147; Nedjef, 366; Kerbella, 1,480; Hillah, 49; Bagdad, 17th September to 3rd December, 262.

While this extension of cholera was in progress along the course of the Lower Euphrates, from below upwards, that is to say, against stream, an extension of greater magnitude was also in progress, on both the Upper Euphrates and Upper Tigris, from above downwards, that is to say, with the stream.

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* The main stream of the Euphrates has since 1865 (if the local topography at that date is to be trusted) become lost in the rice fields which lie between Lamlum (now deserted) and Samava. Before reaching this district the volume of the river has been much diminished by numerous outflows along irrigation canals and into the vast marshes which exist on both sides of the stream below Musseyib. The main stream in this part of the river's course is now represented, according to Mr. W. H. Colvill, who visited this locality in the spring of this year (1875), by the canal of Hindieh, which opening near to Musseyib, flows through the marshes which lie between Hillah and Nedjef into the lake called the Sea of Nedjef (Bahr-el-Nedjef); and by the outflow of the Sea of Nedjef, which enters the proper channel of the river by two outlets, here forming again a considerable stream a short distance above Samava.

† International Sanitary Conference, 1866, *Rapport sur la Marche*, &c., p. 20.

Following upon the exodus of population from Aleppo in August, when cholera broke out there, as already described, and upon the passage of the Persian pilgrim caravan, the disease appeared in succession at Biredjik on the Euphrates, at Orfah on the route to Diarbekr, and at the end of the month it was reported to be present at Diarbekr on the Upper Tigris. The next month, September, cholera was reported at Anah* and at Hit,* on the Euphrates, and at Mosul and Samara, on the Tigris, in the order mentioned. Moreover, spreading westwards and southwards from Mosul, the disease appeared at Arbil and Kerkook, and in October, at Suleimanieh, near the Persian frontier. In the last-named town the disease continued throughout the winter, causing numerous deaths.

The localities mentioned in this distribution of cholera, in the upper portions of the valleys of the Euphrates and Tigris, all lie upon the routes which would be traversed by the Persian pilgrims, in their further journey homewards from Syria. Some of these pilgrims would descend the Euphrates from Biredjik to Musseyib for Kerbella and Nedjef ; others would pass directly homewards by Diarbekr and the valley of the Tigris to a convenient route across the border. The localities to the north and east lie upon the most accustomed trade routes from Syria to Persia, the pilgrims being traders as well as devotees. But a like series of events probably occurred here as had been observed in the diffusion of the epidemic from Alexandria, and in its passage through Arabia, and along the Lower Euphrates. The disease seems to have spread from one new centre of infection to another rather than by continuous propagation through the agency of the pilgrims, the fugitives from Aleppo, or other infected towns of Syria first carrying the malady into northern Mesopotamia. No cholera appears to have been observed among the Persian pilgrims travelling homewards by way of Syria. (*See* Map II.)

1866.

1866.—This year, 1866, cholera reappeared in several localities of Mesopotamia, extended widely in Turkish Kurdistan, and, spreading eastwards, crossed the Persian frontier into the province of Azerbijan.

The disease had continued in Suleimanieh throughout the winter, and after an interruption in February, reappeared in that town in March. The same month it broke out at Oin on the road to Akerta, advancing into Persian territory. In March also isolated cases began to be reported in Bagdad, and 10 such cases were recorded between the 26th of the month and the 5th May. No further cases, however, appear to have been observed in this city until August, when the disease reappeared, and from that date to the 28th November, caused 172 deaths. In June, cases occurred both in Kerbella and Nedjef, and in this and the following month, the disease was reported to be severe at Jezirah and to have extended to Singar, ceasing in both places in August. There were

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* The International Sanitary Conference, 1866, in the report referred to in the previous note, mentions as affected in this extension of cholera "Anah-Hit;" and Dr. Fauvel, in his official reports on the organization of a sanitary service on the Turco-Persian frontier, (*Recueil des Travaux au Comité Consultatif d'Hygiène Publique de France*), refers to "Hitt-Annah" on the Euphrates, and he describes it (vol. 2, p. 38) as "the place where the caravans from Syria cross the river." English geographers describe, and English atlases show, two towns on the Euphrates, namely, Anah and Hit, the latter situated 80 miles or thereabouts below the former. General Chesney, when he visited Anah in 1835, travelling to it, in nineteen days, across the desert from Damascus, and first reaching the Euphrates at El Kaim, a short distance above Anah, found the town then to consist of about 500 clay houses, scattered along the right bank of the river nearly four miles, and "almost hidden in groves of date, fig, and pomegranate trees."—*Narrative of the Euphrates Expedition*, p. 66.) Hit has been known for its bitumen-springs and bitumen-coated boats since the days of Herodotus.

several cases at Basra in July, and a slight outbreak occurred at Mosul this month. There were also slight outbreaks in August at Hillah, Kifri, and Imam Moosa. In October the disease showed itself in a severe form at Mendeli, and the same month it appeared at Khanikin* on the Persian frontier, the principal quarantine station on the northern route from Persia to Bagdad. In November the disease is reported to have ceased altogether in the province of Bagdad.

In the greater number of these instances, the appearances of cholera were slight, and in none did the disease exhibit much diffusiveness. Further north, however, in Turkish Kurdistan, cholera manifested greater activity. At what particular date cholera appeared in Diarbekr is not known, but in July information was communicated to the sanitary department at Bagdad that cholera had entered Persia across the Kurdistan frontier ; and early in August there was an alarm in Aleppo of extension of cholera in that direction from Diarbekr. The movements I am about to describe must then have taken place in the first half of the year. West of Diarbekr, and lying between that town and Orfah, the town of Swerek was attacked. East and north of Diarbekr, cholera extended to the country west of Lake Van. Here it prevailed in the districts of Bitlis, Akhlat, and Bulanyk until late in the year, and spread northwards to Maka, a town lying about midway between Bayazid and Nakitchevan. North of Maka the disease, in November, was reported at Kars, and Erivan ; and east of Maka, the same month at Nakitchevan. The next month (December) cholera penetrated still further to the north, in Transcaucasia, and appeared at Tiflis.

While this extension had been taking place from Diarbekr, on the Turkish side of the frontier, and had passed northwards across the Persian frontier into Transcaucasia, further south, cholera, starting apparently from Suleimanieh, had crossed the Persian frontier. It has already been stated that in March the disease had advanced from Suleimanieh to Oin, on the road to Akerta. This last-named village is situated at the point where the road from Suleimanieh to So-uj-Bulak and Mehemetabad crosses the frontier. The disease was first heard of in Persia at So-uj-Bulak where, early in June, it was reported to be prevalent. Subsequently it spread over the districts of Solduz and Urumiah, the former lying between So-uj-Bulak and Lake Urumiah, the latter to the west of this lake. In the city of Urumiah (population 30,000), the mortality from cholera, before the close of August, was estimated at 4,000. West of Urumiah, the disease penetrated, for the first time, it is stated, into the mountain districts. On the 1st September cholera broke out at Tabriz. The disease lasted 40 days in the city, causing it was estimated, 6,500 deaths among a population of 80,000, Before the outbreak had ceased in Tabriz, cholera appeared at Resht, in Ghilan, on the south shore of the Caspian, and afterwards at Kazoin, on the road from Resht to Teheran. There was a rumour also at the close of the year of cases in Teheran. (*See* Map III.)

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* Khanikin is situated on the principal route traversed by pilgrims, coming from northern and central Persia, on their way to Nedjef and Kerbella. It is close to the frontier on the Turkish side, and is the locality of perhaps the most important frontier-station of the Ottoman Sanitary Administration. Dr. Fauvel (writing in 1850) describes Khanikin as " un bourg habité par 400 familles, et qui doit toute son " importance au passage des pélerins. Aussi, un superbe Khan á l'usage de ces " derniers et un magnifique pont en briques jetè sur l'Elvand y forment-ils un " contraste singulier avec l'aspect misérable de la localité." (*Recueil des Travaux du Comité Consultatif d'Hygiène Publique de France*, t. 2, p. 35.) Mr. Colvill visited Khanikin in 1871. His description of what he observed there is given in the account for that year. (*See* foot note, p. 110.)

1867. 1867.—Mesopotamia appears to have been almost free from cholera in 1867. No reports were received at the sanitary department, Bagdad, of its presence in any part of that province, except at Suleimanieh, where a few cases were reported to have occurred in May or June. In Persia, the disease reappeared to some extent in the province of Azerbijan, but of the particular localities of appearance nothing is known.

In spring the epidemic reappeared in Mazanderan and spreading through that province attacked Amol, Balfurush, and Sari, extended into the province of Astrabad, and broke out in that city in August. Travelling southwards from Mazanderan, the disease appeared in numerous places along the road from Teheran to Meshed in the course of summer (Khatounabad, Heivanekief, Damgan (June), Semnoon (end of summer), Lazgird, (middle of summer,) &c., and showed itself in Teheran. A report, dated the 28th August, states that before that date, 150 cases had occurred in the capital. The disease continued there until the end of October. South of Teheran cholera spread as far as Kashan; and westwards there was a slight diffusion into the district of Zerbend. Eastwards of Mazanderan and Astrabad cholera extended to Subzawar, Nichapur, and other places on the route to Meshed, and in December appeared in the latter city. (*See* Map IV.)

1868. 1868.—The progress of cholera in Persia in 1868 is of remarkable interest. Throughout the year Mesopotamia, and generally the Turkish dominions in Asia were, so far as is known, free from the disease. During the winter of 1867–68, cholera did not wholly cease in Mazanderan. In February the disease was still prevalent in Balfurush, and was reported spreading there in the environs of that town. The same month isolated outbreaks appears to have taken place on the opposite side of the country, in Serpul and Shuster, Khuzistan.

With the advancing spring cholera again became active in the north-eastern provinces. In April the disease was very intense in Bujnurd, about midway between Astrabad and Meshed, on the northern route between the two cities. In May it existed at Amol. It appeared also in Sari. Towards the close of spring and at the beginning of summer it showed itself in numerous places on the routes between Mazanderan and Astrabad and Khorassan, and between Teheran and Meshed (Khatounabad, Heivanakief, Khowar (district), Dehnemek. Lazgird, Sourkeh, Semroon and district, Shah-rud, Subzawar and district, and Nichapur). In June the disease reappeared in the east, at Meshed, and in Teheran.

Meshed is one of the sacred cities of the Shiah Mahomedans and a great centre of pilgrimage and commerce, maintaining a considerable trade with Bukhara, Balkh, and Afghanistan, as well as with the different provinces of Persia. At the time of the reappearance of cholera there in June 1868, pilgrims were flocking to Meshed, and in July, when the city was crowded with devotees and traders, the disease became very virulent. With the termination of the pilgrimage and the departure of the pilgrims a diffusion of cholera began which forms the peculiar feature of the prevalence of the disease in Persia this year. In the track of pilgrims returning from Meshed it was carried southwards to Khaf, to Birjand, to Kirman, and to Yezd, appearing in Kirman on the 20th October, and in Yezd on the 13th September. Westwards it was carried along the road to Teheran, aggravating the already existing cholera along the route. On the 5th August, a caravan of 5,000 pilgrims from Meshed entered Teheran. Up to this date the cholera present in the city had been little in amount and had shown but slight diffusiveness. There were several cases of cholera among the pilgrims when they came into the city. Following upon their entrance,

cases appeared in the city in rapid succession, and from the 7th to the 22nd August 343 deaths were ascertained to have occurred. The disease next spread in the villages near to the capital, and extended westwards to Hamadan, and southwards to Ispahan, appearing in the former town on the 20th November, and in the latter at the end of the same month.

At Hamadan the disease was still prevalent at the close of the year. At Teheran the outbreak had well nigh ceased about the middle of December. From the 27th November to the 15th December, 234 deaths were known to have occurred there. The total loss of life during the prevalence of the disease does not appear to have been ascertained. Cholera prevailed in Meshed during the three months June, July, and August, extending to the neighbouring villages. North of Astrabad the disease broke out with much severity at Ak-kaleh on the Gurkan River. A body of soldiers coming from Ak-kaleh, at the time the disease was prevalent there, re-introduced the malady into Astrabad, where it caused 100 deaths among the troops, and 50 deaths among the civil population. Still further north, on the Attrek, cholera broke out in the course of the autumn, among the Yomut Turcomans. (*See* Map V.)

1869.—The diffusion which had begun from Meshed the previous year continued, in 1869, along the various routes which cholera had most conspicuously followed. In Khorassan, and especially in Yezd, the disease was still active in the autumn of this year. Hardly a locality traversed by the route from Meshed to Teheran, and visited by cholera in 1868, escaped another visitation of the disease in 1869. In Teheran there were several cases of cholera in April, but in June the malady once more became epidemic there, the deaths during part of July numbering 80 daily. This outbreak continued until late in the year. South of Teheran, cholera was present in Kum in February, in Kashan in May, and was active in Ispahan in July and August. From this point which had been reached by the disease the previous year, cholera was carried still further south to Shiraz. In this city the disease appeared about the 15th July and continued until the 16th August. During this period, according to Major St. John, who was at Shiraz at the time, the mortality was probably 2,500 out of a population estimated at 35,000. From Shiraz the disease was disseminated in the neighbouring district and along the road to Bushire. At this last-named town and in villages adjacent cholera appeared in October, but it is undetermined whether as an extension from Shiraz or from some other source. 1869.

On the western route from Teheran, cholera had continued at Hamadan from the previous year until the beginning of January 1869; and in the course of this month, towards the end, it broke out at Kirmanshah and in three weeks caused 100 deaths, among a population of 30,000. In February, also, a group of cases occurred at Nassur opposite Fao-el-Jub, near the mouth of the Shat-el-Arab, five deaths from cholera occurring there on the 16th of the month, and three on the 17th.

Not until August was any further activity of the disease observed along the route by way of Hamadan and Kirmanshah across the frontier. But in August, contemporaneously with an influx of pilgrims coming from the interior, and on their way to Kerbella and Nedjef, the disease re-appeared at Kirmanshah; and it subsequently broke out in several localities along the route traversed by the pilgrims, and in the two sacred cities. Cholera also appeared and prevailed with some severity in the district of Khalis, on the Turkish side of the frontier, and lying between Bagdad and the frontier quarantine station at Khanikin. In Bagdad, on the

14th October, a case happened in a family lately arrived from Persia, and it was followed at intervals by other cases. Except in Kerbella and Nedjef the disease, in this extension into Mesopotamia, did not manifest much activity. From the 10th October to the 12th December, there were recorded in Bagdad 39 deaths from cholera, in Imam Musa 18, in Kerbella 210, and in Nedjef 343. In the course of December several cases of cholera were reported at Mohammera, at Diwanieh (among troops stationed there), and at Suleimanieh.

In the north and east of Persia this year, Kasbin, Tabriz, and Tadjirsh did not wholly escape; the provinces of Ghilan and Mazanderan were still infected to some extent; the soldiery in Astrabad again suffered; there was a virulent outbreak at Anzan, a village in the district; and at Meshed there was a fresh outbreak, at the end of August or beginning of September, which at one period of its progress caused from 50 to 60 deaths daily. Late in December, Teheran, and the provinces of Ghilan and Mazanderan were reported to be entirely free from cholera. (*See* Map VI.)

1870.

1870.—At the opening of 1870 cases of cholera were still occurring among the troops at Diwanieh on the Lower Euphrates, but elsewhere in the province of Bagdad no other occurrences of cholera took place until September.

In April the disease broke out in the neighbourhood of Kirman, in South Persia, a continuation doubtless of the extension of the two previous years in Khorassan and Yezd. Cholera was prevalent in the province of Kirman in August, and in November, about the middle of the month, it appeared at Bunder-Abbas, on the coast of Mogistan, south of Kirman, where it was stated to have been introduced by a caravan from Kirman. Here the disease caused the death of from 300 to 400 persons in three weeks. In August cholera reappeared in Kum, Seidabad, Hamadan, and Kirmanshah, but in the latter place only seems to have been serious. There, from the 3rd September to the 19th, 257 deaths occurred. In the course of September cases of cholera occurred at Kirzabad on the Persian side of the Turco-Persian frontier, and at Khanikin* and Kuzlrobat, on the Turkish

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* "On my way from England last autumn to rejoin my appointment, by Russia and Persia, I had to spend ten days in quarantine on the frontier at Khanikin, and I can best give an idea of Turkish quarantine by trying to sketch what I saw. Khanikin is a town of about 2,000 inhabitants. Here the river Diayalah, crossed by a stone bridge, separates Turkey from Persia, and at the Persian end a plot of ground bounded on one side by a canal was marked out as the quarantine camp, and here for two months before my arrival as many as 5,000 travellers, Asiatic Russians, Afghans, and Persians, had at the same time been encamped. Each company, on coming in, was supposed to pitch its tents a few feet apart from the previous arrivals, though the people mixed freely together. I arrived half an hour before midnight, and the stench from dead quadrupeds and all manner of abominations was frightful, but that was not all; for if a person were found dead from cholera, his company had to begin the quarantine afresh, the result being that no sooner was the breath out of the dying man than his friends scraped a hole in the ground under the tent and pushed him in, while after them another company would arrive, pitch on the same ground and probably do the same. In one case the friends were in such a hurry that they left the dead man's beard protruding; the jackals came, and next morning his bare jaw bones were sticking through the ground. No account is kept of the arrivals, and no care whatever is taken of the travellers, but that is no fault of the sanitary officers, for they have not the means. While I was there the dead body of a Persian was found, and the Persians raised a storm which threatened to be serious,—for they were numerous and well armed,—when they heard they had to begin quarantine anew. The Persian Agent sided with his people, by declaring the man had died of fever, while the Turkish authorities took the other view of the matter. They agreed to refer the affair to myself. I found them

side. On the 21st September the Shah left Teheran on a pilgrimage for Kerbella and Nedjef, his camp containing 10,000 men and 13,000 animals. Cases of cholera occurred in the camp from time to time for several days after the march commenced, but before the camp reached Kirmanshah on the 27th October, it was reported free from disease, and it was suffered to pass the frontier without being subjected to quarantine. After the departure of the Shah from Teheran there was a sharp outbreak of cholera in the capital, which continued during October and November, the deaths at one period being from 130 to 140 daily. This outbreak was attributed to the disinterment of about 300 corpses for the purpose of carrying them to Kerbella and Nedjef, for re-burial there in the sacred soil, according to a practice of the Shiah Mahomedans. The majority of these corpses were of persons who had died of cholera. The Shah issued an edict this year that in future this practice should be limited to corpses that had first been buried at least five years.

Except two deaths from cholera in Bagdad in October, and a slight appearance of cholera in the district of Khalis the same month, no manifestation of cholera followed upon the passage of the Shah from the frontier to the sacred cities, and no cases were recorded in Kerbella, and not until later in the year in Nedjef. North of the Shah's route, 20 cases were reported at Hibhib, a village 10 hours distant from Bagdad; and a singularly fatal outbreak occurred at Tomar, near Suleimanieh, which is stated to have caused 775 deaths in 11 days (15th to 26th October).

In December a virulent outbreak occurred at the village of Soodeah, near Shiraz.

Early in the same month three cases of cholera were reported to the Ottoman Sanitary Administration at Bagdad as having occurred in Nedjef.* From this period no further information was received of the presence of cholera in the province until the beginning of March 1871. (*See* Map VII.)

On the 10th March 1871, the appearance of the disease at Kurna 1871.

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ranged—the Persians on one side of a ditch and the Turks on the other, while a dead body, stark naked, lay in the bottom. The Persian account of the dead man's case, though very circumstantial,—that he had been seized with fever many days from the frontier and had died from exhaustion,—I could see was not expected to be believed; but as no orders had been issued to the travellers, I proposed, as the company had still eight days to remain, that this case might be overlooked, while a proclamation should be issued to all that every one who died should be considered to have died of cholera, unless the illness had been previously reported. The decision appeared to satisfy both sides. I was very much struck with the energy and perseverance of the European officer here, but what could he do, single-handed, amongst 5,000 constantly coming and going, men from the north, not by any means in the best of temper, and whose language he could not understand? The provisions purchased through intermediates were dear. This camp, varying from 3,000 to 5,000, was simply a hot-bed of disease; while it did not prevent cholera entering Turkey by that road, for it appeared at Kizil Robat, a village of about 800 inhabitants, 16 miles on the way towards Baghdad, and for 10 days five to six people died daily; and yet this camp, behind the disease, was kept up for a couple of months after that, while no quarantine was established between Kizil Robat and the interior, that is towards Baghdad."—Mr. Colvill, "*Short Report on Cholera Epidemic in Turkish Arabia in* 1870-71."—Transactions of the Medical and Physical Society, Bombay, No. XI. 1871, Appendix, p. xxxix.

* "Were supposed to have happened." Mr. Colvil, Report to Indian Medical Department. *Transactions of the Medical and Physical Society, Bombay,* No. XI, 1871, Appendix, p. xxxvii.

was notified,* and on the 17th at Basra. But in February, cholera had broken out at Bushire, and subsequently it became widely prevalent on both shores of the Persian Gulf and Gulf of Oman.

The disease, as already stated, had appeared on the eastern shore of the Persian Gulf, at Bunder Abbas, about the middle of November. It is believed to have been carried there by a caravan coming from Kirman. The person first attacked was an attendant of the governor, who having been sent to meet the caravan and receive letters, was seized with cholera on his return to the town. Cholera prevailed in Bunder Abbas four weeks, causing, it is estimated, from 300 to 400 deaths. The dates of the subsequent appearances of the disease on both shores of the two gulfs are not known. At Bushire the malady had assumed serious proportions on the 28th February, and it continued to prevail until May. The number of deaths occasioned by it in the town is believed to have been not less than 2,000. The villages in the district adjoining the town also suffered from the disease. In May, cholera was prevalent at Deyer, 90 miles south of Bushire, and at Bahrein, on the opposite coast. In June it was present at Khatif ; and a report from native sources stated that the deaths in Bahrein had fallen from 120 daily to three or four. In July, Lingah, on the east coast, and Maskat, on the west coast, were reported to be infected with cholera. The deaths from the disease were numerous in Khatif this month. In August, cholera re-appeared in Bahrein. In September the disease was reported to be generally diffused among the districts of the littoral. On the eastern coast the prevalence of cholera this month was particularly noted at Shargah, Ras-el-Khymah, Lingah, Bassidore, Kishm, and in the villages adjacent to these places.

While this considerable extension of cholera was in progress upon both shores of the Persian Gulf, and of the Gulf of Oman, a hardly less considerable extension was proceeding along the rivers Shat-el-Arab, Euphrates, and Tigris. I have already noted the appearance of cholera at Kurna and Basra in March 1871. The same month also the disease was reported at Fao-el-Jub, near the mouth of the Shat-el-Arab, and Suk-e-Sheyukh on the Euphrates. It was noted at the time that cholera was mainly prevalent in these places among Persian pilgrims on their way to Nedjef. Bushire, where cholera during this month was prevailing seriously, is an important port of departure for pilgrims journeying to Nedjef and Kerbella. There is no information of the progress of cholera in Irak Arabi in April, but in May the disease was prevalent among the Beni-Lami Arabs who occupy the districts on both banks of the Lower Tigris, below the beginning of the Shat-el-Hie. In June cholera was present in the two pilgrimage towns of Nedjef (Meshed Ali) and Kerbella (Meshed Hussein) on the borders of the Syrian desert, at Diwanieh and Hillah on the Euphrates, at Kut-el-Amara, Amara, and Bagdad, on the Tigris, at Mendeli near the Persian frontier, and among a Turkish expeditionary corps, destined for Central Arabia, in the vicinity of Basra. On the 9th June, 40 cases of cholera and four deaths from the disease were reported from Nedjef. The duration and degree of prevalence of the disease in Nedjef is not known. In Kerbella the mortality must have been large, and the disease was not extinct there in December. In Bagdad 140 deaths were reported between the 20th June and 25th September ; and in November cholera reappeared there among a body of troops recently arrived from Aleppo. The disease died out in the city apparently in December.

An interesting episode of the extension of cholera on the west of the

* "Four or five people died, and the disease ended on the 15th."—Mr. Colvill, Report cited above, p. xxxviii.

Euphrates, in June, was the carriage of the disease into the Jebel Shomer district, Northern Arabia, by a body of Persian pilgrims leaving Nedjef early in the month. This episode and its consequences will be related in a separate section. (*See* (a), p. 114.)

In July cholera appeared at Suleimanieh and Khanikin,* and in the former town it prevailed with much severity. On the 29th of the next month (August), 188 deaths were reported to have occurred that day in Suleimanieh; in Khanikin from the 2nd to the 11th August, 20 deaths were reported.

In August a very severe outbreak of cholera happened at Kerkuk after a violent rain-storm. Not less than 1,200 deaths, it is believed, occurred within a period of 20 days, among a population estimated at 25,000.

In November cholera was reported in Mardin at the extreme north of the province of Bagdad, in Revanduz, and in Mosul.

I have described the prevalence of cholera on the littoral of Southern Persia in 1871, in conjunction with the prevalence of cholera on the littoral of Eastern Arabia, the topographical relations appearing to me of more interest than the territorial. I return now to the further progress of cholera within the Shah's dominions this year. It will be remembered that 1871 was a year of great famine in Persia. In several districts of the interior and the north, cholera added to the miseries of dearth. In May the disease reappeared in Teheran and Shiraz. The outbreak at Teheran is described as being of less severity than preceding outbreaks. It ceased in July, and the greatest ascertained daily mortality from the malady was said to be 120. In June cholera was present at Turco-mantchai, near Tabriz, and it prevailed with great severity at Kashan and Sheriff Shiraz. In July the disease was prevalent in Zendjan, Kazom, Ardetil, Hamadan, and Tabriz. On the 29th July the mortality from cholera in the last-named city was reported to be 120 daily. In August the disease was generally prevalent throughout Azerbijan. At the beginning of the month the deaths in Tabriz had increased to 200 daily. In October, cholera was reported prevalent at Urumiah, Selma, Hufa, Amol, and Astrabad. From the province of Astrabad the disease is believed to have extended into Central Asia. The prevalence of the disease there in 1871–72 will be considered in a separate section. (*See* (b), p. 116.)

While the movements of cholera in 1871, above described, were in progress in Eastern Turkey in Asia, Eastern Arabia, and Persia, the disease also existed in Western Turkey in Asia. It broke out in the district of Brusa in June, and at a later period it appeared at Ismid, Kutaye, Amassia, and Samsun. The chronological relationship of these appearances was with the European extension of the malady this year, and they will be described with that extension.

1872.—Cholera is reported to have ceased altogether in the province of Bagdad in January 1872; and no information as to the existence of the disease in other parts of Turkey in Asia has been received from the close of 1871 until the present year (1875). In 1872 two outbreaks of cholera appear to have been alone reported in Persia. One of these occurred in Hamadan, beginning on the 8th July and ending on the 31st August. The greatest daily mortality in this outbreak was 23. The other outbreak occurred at a place designated in the official despatch Meghes. Since 1872 cholera has not been officially reported in Persia. 1872.

* See foot note to p. 117.

(a.) *The Diffusion in Arabia and Nubia in* 1871-1872.

The diffusion in Arabia and Nubia in 1871 and 1872 was an offshoot of the diffusion during the first-named year in Irak Arabi. On the 19th June 1871 cholera appeared in Haiel, the principal town of the Jebel Shomer district, northern Arabia. The disease is reported to have been introduced there by a caravan of Persian pilgrims bound for Mecca, and coming from Nedjef, where cholera was prevalent at the time of its departure. From Haiel the disease was propagated along the caravan route to Medina, by way of Khaiber. Cholera appeared at Khaiber on the 14th July, having been brought there by an infected Bedouin tribe. On the 10th August the disease appeared in Silsilah, midway between Khaiber and Medina ; and in September it broke out in Medina, first attacking a body of troops who had newly arrived in the city from Khaiber. On the 24th September the Nejediye caravan, last from Medina, entered Mecca with sick from cholera among the persons constituting it, and on the 21st October the disease broke out in the city, and prevailed there more or less until the 25th January 1872, when it apparently ceased. After the appearance of the disease in Mecca a body of troops marching thence to Confodah, on the sea-coast south of Jidda, conveyed the disease with them, infecting the garrison of Confodah, where cholera appeared on the 18th November. At the end of October, when the influx of pilgrims had begun, one or two doubtful cases of cholera were reported in Jidda ; and on the 19th December the disease appeared in Yembo, north of Jidda, supposed to have been introduced there from Medina.

At the beginning of 1872 cholera was still active at Confodah and, as already mentioned, Mecca. On the 8th January it was reported that there had been 295 deaths from cholera among the troops at Confodah in the preceding fortnight, and 18 deaths among the civil population. Early in January a body of troops, numbering 5,000 men, was sent from Confodah to Hodeida by sea, cholera existing among them at the time. When these troops reached Hodeida they were not suffered to communicate with the town, but were marched 20 miles away from it, and there encamped and isolated until the disease died out. Early in February the general in command of these troops reached Hodeida from Confodah, bringing with him a detachment of 800 men also infected with cholera. This detachment was at once admitted into the town, and the disease spread to the garrison and the civil population, and continued to prevail among them until late in March.*

In January, while cholera was still prevalent in Mecca, a caravan leaving that city for Medina, by way of Bedr, was attacked with the disease on the second day of its journey, and 80 persons lost their lives in two days.

On the 27th February cholera reappeared in Mecca, no cases having been noted since the 25th of the preceding month. Within this interval the pilgrimage of 1872 had been accomplished and the great mass of the pilgrims had left the city and its environs. The days of the religious rites were from the 19th to 23rd February, and it is estimated that on the principal day there were assembled together 110,000 pilgrims, chiefly Bedouins. During the rites and when the congregation of pilgrims was greatest, no cholera was observed; but a disease, described as "an "epidemic fever with rheumatoid symptoms and not fatal," prevailed extensively among them. This malady was no doubt *dengue*, which had

* *Fauvel*, Rapport sur la Marche du Choléra en Orient depuis le mois de Janvier 1872. (*Recueil des Travaux de Comité Consultatif d'Hygiène Publique de France.* Tome iv., p. 63, 1875.)

previously been prevalent on the East African coast, and which had appeared in Zanzibar immediately after the cessation of cholera in that island, in July 1870.

Arabia, 1871-72.

Cholera at the time of reappearance in Mecca was first observed among Takruri pilgrims—Mahomedan negroes from Africa—who had not departed. The history of the caravans which had already left Mecca, so far as this is known, proves that cholera was becoming active at the moment of dispersion of the pilgrims. The Damascus caravan, numbering 4,000 persons, took its departure on the 25th February. Two days afterwards, that is to say on the 27th, the day when cholera was first observed among the Takruri pilgrims still remaining in Mecca, cholera broke out in the caravan. Other caravans were also attacked with cholera on their route to Medina, and it is estimated that of 25,000 pilgrims who travelled homewards by this route, 4,000 lost their lives from the disease between Mecca and Medina. Cholera, according to the official reports, reappeared at Medina on the 8th March; but the native medical officers attached to the Damascus caravan stated, that when that caravan reached Medina on the 10th March, they found cholera very prevalent among the pilgrims there. Cholera prevailed in Medina until the 3rd April, causing 1,800 deaths among the inhabitants of the city. The Damascus caravan was still suffering from cholera when it reached Medina, and it did not become free from the disease until it arrived at Mudayn-Saleh on its further course. Altogether cholera destroyed, it is believed, 400 lives in this caravan during its homeward journey. The Grand Caravan of Cairo, numbering 1,130 persons, reported 24 deaths from cholera between Mecca and Medina; and after leaving Medina until it reached El Wedj, five deaths from ordinary ailments only.

Cholera reappeared in Yembo, brought there it is believed from Medina in April; but Jidda and the sea-route appear to have been quite free from the disease.

No cases of cholera were reported at Hodeida after the 25th March; and none at Mecca after the 18th April.

After the news of the reappearance of cholera at Medina reached Egypt, ships carrying pilgrims from the Hejaz ports, were subjected to 20 days detention at El Wedj, and the pilgrim caravans going by that route to a detention of 15 days. A detention of 10 days at Moses' Wells was also directed for the caravans, in the event of any suspicious sickness or death among them during the journey from El Wedj to the vicinity of Suez.

Nubia, 1872

Nothing appears to be known of the progress of cholera in Yembo after its appearance there in April. No subsequent outbreak was reported in Arabia, but in June the disease broke out on the opposite coast of the Red Sea. Cholera appeared there first among a body of Soudani troops, which left Suakin for the interior, mounted upon camels, and among the camel attendants, about the middle of the month. On the route to the Bedouin town of Hatanie, district of Manderieh, province of Taka, 12 or 13 days' journey for camels from Suakin, and which was reached on the 30th of the month or a little earlier (for the official details of the movement are wanting in precision), nine of the soldiers died from cholera, and 20 of the attendants. Moreover, the disease was communicated to the villages or towns of Tokar and Helet-el-Hatinie, through which the troops passed; as also to Hatanie after their arrival there. It is stated that at the time the troops left Suakin there was no cholera in that port, nor did any appear afterwards. But the reports give no information as to the previous history of the infected troops, or of the movement of pilgrims and others returning from the Hejaz, especially of the Takruris; and the reporters do not

appear to have been aware of the extent of prevalence of cholera among the pilgrims on the route from Mecca to Medina, of the serious outbreak in the latter city in March, and of the presence of the disease in Yembo in April. Suakin was, indeed, the one port on the western coast of the Red Sea peculiarly liable to infection from Yembo; and the line of dissemination of the disease and time of appearance in the province of Taka, while consonent with the theory of infection, is hardly reconcilable with a suggested theory of development from exceptional meteorological conditions, not peculiar to Nubia at the time but common to vast tracts of adjacent countries. The absence of details such as we have indicated implies that the reporters had not the clue in their hands and had failed to discover it. It detracts, moreover, from the value of the statement regarding the entire freedom from cholera of Suakin at the period when the infected body of troops or of camel attendants left it, and for a short time previously.

Cholera, after the appearance described in the province of Taka, spread to some extent in the adjacent provinces of Berber and Dongola. The following is the official return of the periods of prevalence and loss of life from the disease in the several provinces:—

Nubia.—Cholera, 1872.

Provinces.	Dates of Prevalence.	Monthly Mortality.	Total Mortality.
Taka	30th June to 2nd September	240	397
	30th October to 4th November	157	
Berber	17th August to 2nd September	478	691
	3rd September to 2nd October	114	
	3rd October to 31st October	99	
Dongola	3rd September to 2nd October	623	882
	3rd October to 31st October	250	
	1st November to 30th November	9	
			1,970

Cassala and Tokar were both affected during the later period of the outbreak in the province of Taka. According to information received at the time, the disease appeared in Cassala on the 11th October, and did not cease there until the 30th November, during which period there were 165 deaths, of which 14 only occurred after the 10th November. In Tokar the disease reappeared on the 19th October. This outbreak was confined to troops and their families, and continued until the 25th November, during which period there were 65 cases and 35 deaths. It will be observed that the province of Suakin, in which Tokar is situated, is not mentioned in the summary return; and that the information as to Cassala would make the later period of the outbreak in the province of Taka of greater duration and more fatal than the summary return shows. (*See* Maps VIII., IX.)

(b.) *The Diffusion in Central Asia*, 1871 *and* 1872.

While cholera in 1871 was extending westward from Irak Arabi into Arabia, it is probable that it was also extending eastward from Persia into Turkestan. The following account of this diffusion is, with the

exception of two or three particulars obtained from Indian sources, taken from an article by Dr. M. Souvorov, Councillor of State and Inspector of the Military Medical Circuit of Turkestan, published in the *Turkestan Gazette*.*

Dr. Souvorov is enabled to state positively, as the result of his inquiries, that cholera was present in Bukhara in 1871, although it did not show itself there in a very active form in that year. He infers that the disease had extended into Bukhara that year from Persia. I have already described the prevalence of cholera in the province of Astrabad in 1871, and it is not improbable that Dr. Souvarov's inference is correct. But in 1869, cholera, according to Dr. Bryden,† was prevalent in Jellalabad and Cabul in September; and late in November it had not entirely ceased. There may have been extensions from Eastern Afghanistan through Kunduz into Bukhara, but it is hardly likely that two years continued prevalence of the disease in that country would not have come to the knowledge either of the Russian or the Indian authorities.‡

At the beginning of May 1872,§ cholera broke out at Djisack, in Russian territory. Dr. Souvarov believes the disease to have been introduced there from Bukhara, but whether at the time of its commencing activity in 1872 or at the close of 1871 is undetermined. He thinks the former alternative more probable. From Djisack the disease appears to have spread as from a centre. To the south it extended to Samarcand, Sehaar (Shehri Sebz?), Kitab, Karshi, Hissar, and (which Dr. Suvarow was unaware of), south of the Amu Daria, to Balkh and westward of that city to Akela. Eastward and southward of Djisack, Tashkurghan, Kunduz, Hazrat-Imam, Gori, and the intervening districts

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* "The appearance and spread of the Epidemic of Cholera in Central Asia in 1872." The *Turkestan Gazette*, 13th March 1873.

† *Report on the General Aspects of Cholera in* 1869 (Bengal Presidency), p. 36.

‡ The International Sanitary Commission of 1866, in its "Rapport sur les "Mesures à prendre en Orient pour prévenir de nouvelles invasions du Cholera en "Europe," observe of Bukhara (p. 62):—"La Boukharie a été souvent visitée par le "cholera. Il résulte des renseignments recueillis sur ce point par M. le Dr. "Polak, que le plus ordinairement, la maladie y vient de *Mesched* avec les caravanes "qui, de cette ville, établissent des relations commerciales importantes avec "Boukharie. Cependant ce n'est pas la seule voie; car il parait établi qu'en 1828 "et en 1845, le cholera y fut importé de l'Afghanistan par la route de Caboul."

With regard to the above asserted frequent prevalence of cholera in Bukhara, the following statement of Dr. Souvorov, in the paper referred to in the text, should be compared. He writes:—"It appears that cholera (in the Tadjiski dialect '*voba*,' "and in the dialect of Ousbeck, '*vuliat*,') did not exist among the populations of "Central Asia for 25 or 27 years, commencing with the years 1846–48, that is, the "time of the second great outbreak of cholera which originated in India and "travelled through Asia and Russia, and the whole of Europe, after the first great "epidemic of the years 1830–32. The old inhabitants of the above-named places "[Djisack, Ura-Tube, Khodjent, Samarcand, Tashkent] tell us that in the years "1830–32, cholera cruelly attacked the population of Central Asia and was spread "over all the Khanates. In the years 1846–48 the disease was considerably weaker, "and from that period until 1872 they had not known of its existence or seen "anything of it. We likewise did not hear of its existence when we were in the "steppes of Central Asia in 1857. . . . . At least one fact is certain that "the epidemic of cholera of the year 1872 as regards the population of Central "Asia and our own territory there is a new epidemic, the third since the periods "1830–32 and 1846–8, from which latter period until 1872 they had been free from "the disease."

§ The *Turkestan News* of the 25th July 1872, publishes a return showing that 675 deaths from cholera occurred in the Province of Kouraminsk from the 8th to 15th April 1872. The same journal of the 1st August notes the cessation of cholera in parts of this province in July.

were affected. Westwards from Djisack the disease returned upon its steps to Bukhara by two routes, Nourata on the north, and Katy-Kourgan on the south. Passing westwards and southwards from Bukhara, cholera entered into the Khanate of Khiva. Eastwards and northwards from Djisack, the disease travelled into Kokan by way of Ura-Tube and Khodjent, also by way of Chinaz, Tashkent, and Chemkend, and on this latter route it reached the district of Tokmak. Cholera was generally diffused throughout the Khanate of Kokan. From Chemkend, cholera extended to the town of Turkestan, and thence it followed the Syr Daria to Kasalinsk.

The further the disease travelled from Djisack, the less active it became. At the beginning of November it ceased entirely in Tokmak and on the Khivan frontier, the extreme points of its extension; and in the course of that month it would appear to have died out over the whole area of diffusion. Dr. Souvarov does not give any general account of the probable mortality occasioned by the epidemic where this could be estimated; but it appears to have prevailed with considerable severity in the infected Khanates.* (*See* Maps VIII. and IX.)

The following observations of Dr. Souvorov on the epidemic of 1872, in Central Asia, will be read with interest :—

"During the course and spread of the disease the following circumstances individually invite attention :—

(*a.*) *The return* (*course*) *of the epidemic from our country into the dominions of Bukhara*, whence it came to us quietly and imperceptibly, whereas it went back with such cruelty that the Beys of the neighbouring Emirs of Bukhara, being panic-stricken at the number of deaths among the people, applied to us for assistance, which was given, and with which they were extremely satisfied. We think that this phenomenon may be thus explained :—When the epidemic (Persian) was approaching us, it was in its period of decline and cessation, whereas when the epidemic (the Central Asian) was returning it was in its period of development.

(*b.*) "Spreading itself principally along the highways, postal-tracts, and in the valleys of rivers, the epidemic severely attacked the settled and half-nomadic population of Bukhara, Kokan, Samarkand, Tashkent, and the district of Zaravshansk and a part of Syr-Daria. Cholera extended likewise to the settled population of the mountains, some seven thousand feet in altitude above the level of the sea; for instance, in the districts of Kouraminsk and Khodjent. The further the Nomads were from the road and postal communications, the less they were attacked by cholera, and when in the midst of steppes they did not have it at all. On the other hand some steppes such as from Djizack to Chinaz, from Turkestan to Kasalinsk, from Chemkend to Tokmak, were not free from the epidemic. True these are situated in the 'rayon' of the postal lines, therefore evidently they owed the cholera to the postal communications and postal stations, fortresses, and forts situated along these postal tracts. Having in view the last fact, a word may be permitted on the bearing of the conclusion come to by the Sanitary Conference at Constantinople : '*As regards the safe-guard afforded by vast steppes against the spread of cholera*,' when the time comes that we shall have in our steppes a well organized postal [posting] communication, *i.e.*, the possibility of being rapidly conveyed from one settled point to another, from one fortress or station

* According to the *Turkestan News* of the 27th June and 1st August 1872, cholera appeared among the natives of the province of Syr Daria on the 30th May; at Tashkent on the 18th June, and at Khodjent on the 20th June. In the town and district of Djisack, 251 deaths from cholera were returned from the 30th May to the 15th June; and 142 deaths from the 3rd to the 20th July. In the town and province of Khodjent there were 455 deaths from the 10th to the 20th July; in the town of Chemkend, 130 deaths from the 5th to the 20th July; in the town of Turkestan 25 deaths from the 13th to the 19th July; in Perovsk, 1 death up to the 16th July; and in Tashkent (estimated population, 40,000), 3,953 cases and 2,503 deaths from the 19th June to the 28th July.

to another. In my opinion the steppes, at present, cannot of their own accord play, in this respect, any separate part, and they form a barrier against the spread of cholera, only because they have no postal tracts and settled points, and cannot therefore give to the spread of the epidemic any infectious centres. But when the steppes will have such communications, it is difficult to say what could serve to hinder, "caeteris paribus," the spread of cholera in the steppes and out of them. From our observations we can bring forward examples where insignificant postal stations placed in the midst of steppes, served as points of infection for a rapid spread of the cholera, and had these not existed the epidemic, "lege artis," would hardly have reached from Djisack to Kasalinsk and Tokmak, through the great steppes. When the question as to the safeguard presented by the vast steppes against the spread of cholera was under discussion, the time was so to say a nomadic one; but now we are under different conditions, we live now in the time of post [posting] offices and stations and have already in the steppes settled points.

As a proof that there really must be a difference in the spread of cholera in the steppes during the nomadic period and the postal period, the following circumstances may be pointed out:—I have already said that in the period of 1846–48 cholera existed among the population of Central Asia, now subjected to us. In 1848 our first fort was erected at the mouth of the Syr-Daria, and in its neighbourhood at that time there was no cholera. I allude to this because when I was ordered to serve in 1857 in this fort, I found no trace of the existence of cholera in examining the papers of the lazaretto of the fort, and I heard nothing on the subject either from my predecessors whom I knew personally, or from the local inhabitants, the Kirgiz. At present, under different conditions, it is seen that the epidemic of cholera from Djizack reached without any hindrance, gradually, so to say, with regular intensity, the town of Kazalinsk, *i.e.*, where it did not exist at all in the year 1848.

(*c.*) A detachment of young soldiers, about 3,000 men, sent to complete the strength of our regiments, arrived here when the cholera already existed at Kazalinsk and Perovsk, and was attacked by it very feebly, the number of those attacked being very few. When the detachment approached Chemkend and Tashkent, where cholera had ceased by that time, the disease also ceased in it.

(*d.*) The steamer "Samarkand," on leaving (with a barge) Chinaz, when the epidemic existed there, received (after a few days' sailing) from other vessels four cholera patients, two of whom died during the voyage, and two subsequently recovered and were conveyed to Petrovsk. This steamer thereby somewhat overtook the regular course by land of the epidemic."

Dr. Souvorov adds the following note respecting the disinfection of latrines and cholera evacuations:—

"According to some surgeons of Turkestan, and my own personal observations during the epidemic, and also in the year 1866 under other circumstances, the daily covering of the evacuations with a layer of small dry clay earth, about a foot in thickness, deserves special attention among other precautions, owing to its effectiveness and its practicability, especially in our country."

IV.—The Recurrence of Cholera in Europe in 1869, and Subsequent Diffusion on the Continent during the Five Years 1870–1874.

Re-appearance of cholera at Kiev, 1869.

With the exception of three small outbreaks, two occurring in the district of Lipowetz, Government of Kiev, Russia, the third at Relinghausen, in Essen, Germany, cholera derived from the diffusion of 1865, seemed to have ceased in Europe, as I have already related, in 1868. When the next year, 1869, early in August, the disease appeared in the city of Kiev, it was not at first recognised as the epidemic malady. So completely had the previous prevalence of cholera in the Empire seemed to have come to an end, that the likelihood of a recurrence did not occur to any observer, until the spread of the disease in the city and to neighbouring governments showed its true nature.

The following account of the outbreak at Kiev in 1869 is given by Dr. Pelikan, the director of the Medical Department of the Russian Government:—*

"In 1869 cases of cholera began to appear at Kiev from the spring, namely, from May $\frac{16}{28}$, when a private of the 46th Dnieper regiment, Matthew Sopchuk, was attacked by the disease in camp; on June $\frac{17}{29}$ Michael Michaelson, a regimental servant belonging to the Kiev artillery, was seized with it; and on July $\frac{13}{25}$ a woman of Kiev, called Ardotia Vitughina, was similarly attacked. Between July $\frac{19}{31}$ and August $\frac{1}{13}$ two gunsmiths, who had arrived at Kiev from the Ijef works in the province of Viatka, and two women belonging to the family of another gunsmith called Lusiatnikoff, likewise from the province of Viatka, were attacked by cholera; and on August $\frac{8}{20}$ a woman from Briansk, who had come to Kiev on a pilgrimage, took the disease. All these cases terminated fatally, either on the same day or on the next, with all the symptoms of Asiatic cholera. From August $\frac{12}{24}$ cases of cholera began to occur daily at Kiev, but as they were confined exclusively to persons who lived under sanitary conditions so unfavourable as to be sufficient of themselves to produce sporadic cholera, the epidemical character of the disease was not defined until after it had attacked consecutively several persons who enjoyed the benefit of living under good sanitary conditions. It must, however, be observed that the cholera epidemic was extremely inconsiderable at Kiev, notwithstanding the immense concourse of pilgrims from the various provinces of Russia, and notwithstanding also that the pilgrims were subjected to the worst possible sanitary conditions. The total number of persons who were attacked by cholera at Kiev in 1869 was 263, while the number of deaths was 152. Such a feeble diffusion of the epidemic, under circumstances apparently so favourable to its retention, caused many Russian medical men to consider the prevalent disease to be not Asiatic cholera ('*cholera Asiatica s. epidemica*') but European cholera ('*cholera nostras*'). But the onward movement of the disease, and its consecutive appearance in the town of Orel (where, from November $\frac{3}{15}$ to January $\frac{15}{27}$, 1870, the number of cholera cases was 407, and that of deaths 224), and later in the winter of 1870 at Moscow very clearly showed its character, and proved that the medical men of Kiev had been right when they pronounced the disease to be Asiatic cholera. In other localities the cholera occurred either in small groups of cases and of mortality or in entirely isolated cases, so that, inclusive of the epidemics in the provinces of Kiev and Orel, the total number of cases of cholera in Russia in the year 1869 was barely 911, and that of deaths 510."

Dr. Arkhangelsky's account of the outbreak at Kiev corresponds with that of Dr. Pelikan in respect to the early cases of the disease in the city, but differs somewhat as to the total sickness and mortality from it, not only there, but also in European Russia generally, this year. According to Dr. Arkhangelsky, 338 cases of cholera occurred at Kiev, of which 162 died, the outbreak commencing on the $\frac{8}{20}$th August and ending on the $\frac{3}{15}$ December. The disease next appeared in the Government of Minsk, when 33 cases were recorded and 26 deaths, from the $\frac{\text{23 October}}{\text{4 November}}$ to the $\frac{\text{26 December 1869}}{\text{7 January 1870}}$. It then showed itself in succession in the Governments of Tula ($\frac{1}{13}$ November), Orel ($\frac{3}{15}$ November), Poltava $\frac{12}{24}$ November), Kursk ($\frac{\text{27 November}}{\text{9 December}}$), Smolensk ($\frac{2}{14}$ December), Moscow ($\frac{\text{25 December 1869}}{\text{6 January 1870}}$). Cases also occurred in the Governments of Kaluga, Novgorod, and St. Petersburg, but the dates of occurrence are not given.

* Memorandum communicated through the Foreign Office to the Medical Department of the Local Government Board, 1873.

In the greater number of the governments the outbreaks continued into the following year (1870), in Tula uninterruptedly until November, but in the other governments ending in the early months to re-appear again at a later date. The governments which suffered most in addition to Kiev were Moscow and Orel. In the former government, 261 cases and 122 deaths were recorded from the $\frac{25\text{ December }1869}{6\text{ January }1870}$ to the $\frac{27\text{ April }1870}{9\text{ May }1870}$; in the latter government, 502 cases and 293 deaths, from the $\frac{3}{15}$ November 1869 to the $\frac{5}{17}$ March 1870. The total number of cases of cholera which occurred in European Russia from the $\frac{8}{20}$ August 1869 to the $\frac{5}{17}$ 5th March 1870 (the return for Tula being given to the $\frac{1}{13}$ January) was, according to Dr. Arkhangelsky, 1,276, of which cases 659 died. (*See* Map 1869.)

Eleven governments of European Russia were infected with cholera in 1869. The following year, 1870, the infection spread over 37 governments, including five of the governments of Poland. The disease did not reappear either in Kiev, or Poltava, or Minsk this year, and it was distributed mainly in the eastern provinces of the empire. I quote Dr. Arkhangelsky's account of the appearance and spread of the disease in 1870 :—

" The existence of cholera again in Central Russia, in 1869, had become indisputable. In the winter of 1869–70 the action of this agent was observed in the government of Orel to the $\frac{5}{17}$ March, in the government of Moscow to the end of April, and in that of Tula until summer, when the disease began to spread rapidly. The epidemic character of the disease first showed itself [this year] in the government of Ekaterinoslav-with-Taganrog. The person earliest attacked was a peasant from the government of Orel who had gone to Taganrog to labour in the fields. He was admitted into the hospital of the Charitable Institutions, on the $\frac{1}{13}$ June, suffering from a severe seizure of cholera, precursory symptoms having showed themselves on the $\frac{30\text{ May}}{11\text{ June}}$. At the time of his admission the sanitary state of the hospital was very bad, and next day cholera began to spread among the patients and attendants, afterwards extending into the town. In the government of Orel cholera was first officially recognised this year on the $\frac{1}{13}$ July. The circumstances under which the disease appeared there remain unexplained. Most likely there were isolated cases at an earlier date which escaped the attention of the medical men. The particulars of the dissemination of the epidemic in 1870 are given in the Epidemiological section of the 'Journal of Forensic Medicine and Social Hygiéne' for the year. The railways between Taganrog and Moscow, and between the Volga and the Don, performed generally a prominent part in the dissemination of the disease ; but notwithstanding the considerable net-work of railway communications and the great extension of steam-navigation on the rivers, cholera spread itself very gradually as may be seen from the table. [See *Appendix*, Table XI.]

" The total length of railway routes in Russia amounted, in 1870, to 10,531 versts, whereas in 1866 the amount hardly reached 4,351 versts, that is to say, there had been an increase of 6,180 versts during the four years. From the Table [XI.] it will be observed that in addition to the governments of Tula, Orel, and Ekaterinoslav, cholera appeared in July [O.S.], in those of Taurida ($\frac{7}{19}$), Kherson ($\frac{21\text{ July}}{1\text{ August}}$), Kharkoff ($\frac{28\text{ July}}{9\text{ August}}$), also in the district of the Don Army ($\frac{27\text{ July}}{8\text{ August}}$), and the government adjacent to it, the district of Kuban [Cis-Caucasia] ($\frac{27\text{ July}}{8\text{ August}}$), in the governments of Saratov and Simbirsk ($\frac{29\text{ July}}{10\text{ August}}$), the government adjacent

to Orel, namely, Kursk ($\frac{19}{31}$), and in Voronej ($\frac{24\text{ July}}{5\text{ August}}$). In August [O.S.], cholera appeared on the shores of the Black Sea, and on the northern slope of the Caucasus ($\frac{4}{16}$), in the government of Stavropol ($\frac{15}{27}$), Astrakhan ($\frac{14}{26}$), Samara ($\frac{15}{27}$), Kazan ($\frac{19}{31}$), Nijnigorod ($\frac{18}{30}$), Pensa ($\frac{22\text{ August}}{3\text{ September}}$), Vladimir ($\frac{24\text{ August}}{5\text{ September}}$), Moscow ($\frac{25\text{ August}}{6\text{ September}}$), Kaluga ($\frac{8}{20}$); and, to the north-east, Perm ($\frac{24\text{ August}}{5\text{ September}}$), Viatka ($\frac{31\text{ August}}{13\text{ September}}$), and Kostroma (date undetermined). To the north-west cholera appeared the same month (August [O.S.]) in the governments of St. Petersburg ($\frac{16}{28}$), Olonetz ($\frac{24\text{ August}}{5\text{ September}}$), and Novgorod ($\frac{28\text{ August}}{8\text{ September}}$). The governments in which the epidemic appeared in September [O.S.] were Tambov ($\frac{13}{25}$), Jaroslav ($\frac{7}{19}$), and Orenburg ($\frac{8}{20}$); in October [O.S.], Grodno ($\frac{28\text{ August}}{9\text{ September}}$), Warsaw ($\frac{2}{14}$), and Radom ($\frac{11}{23}$); and in November [O.S.], Wilna ($\frac{1}{13}$), Kovno ($\frac{30\text{ November}}{12\text{ December}}$), Kalisch ($\frac{2}{14}$), Plock ($\frac{16}{28}$), and Petrokov ($\frac{14}{26}$).

"The epidemic intensity was in general weak, the mortality scarcely exceeding 1 per 1,000 of population. In the government of Orel it was 1·3; in the district of the Don Army, 1·1; and in the government of Ekaterinoslav-with-Taganrog, 1·0. In the remaining governments the mortality per 1,000 population was under 1. Cholera did not appear in the government of Riazan, notwithstanding that the governments surrounding it were infected, and that it was in communication by railway with Moscow. This railway, 196 versts in lengths, carried upwards of 660,000 passengers in 1870, a number little less than that carried by the Kursk-Kharkov railway, 736 versts in length, namely, 736,000. If the different length of the lines be considered, the traffic must have been greatest on the Tambov line. Moreover, on this line there are four intermediate stations."

The geographical distribution of the governments in the order of their infection, in 1870, from the beginning of the epidemic activity in Taganrog, is noteworthy. Taurida, Kherson, Kharkov, the country of the Don Cossacks, and the district of Kuban surround Ekaterinoslav-with-Taganrog—Taganrog, Taurida, and Kuban, lying largely in the basin of the Sea of Azov, and the country of the Don Cossacks in the valley of the Don, where, by reason of the railway between Kalatch and Tzaratzin, the valley becomes part of the commercial system of the Volga. Simbirsk and Saratov lie on the west bank of the Volga, Astrakan on the lower waters, Samara on its left bank, Kazan, Nijni-Novgorod, Vladimir, and Kostroma on the upper waters, Novgorod and Olonetz on its main northern and western affluents, and Perm and Viatka on its main northern and eastern affluents. The peculiarities of geographical distribution here noted, are not without significance in relation to the question of the source of that recurrence of epidemic cholera in European Russia, which is now under consideration.

The total number of cases of cholera recorded in European Russia in 1870 was 21,663, of deaths, 9,386. In Poland the cases numbered 524, the deaths 218. (See *Appendix*, Tables XI. and XII.)

Dr. Arkhangelsky makes no further reference to cholera in Caucassia in 1870 than those which have been quoted with regard to its appearance in the district of Kuban in July, and on the Caucasian coast of the Black Sea, and in the government of Stavropol in August. According to official information, communicated to this Department, the disease appeared at Poti about the $\frac{1}{13}$th August, and prevailed there more or less until the beginning of October. Extending up the valley of the river it broke out at Kutais and Tiflis, in both places, about the $\frac{15}{27}$th August, prevailing there until November; and in September it was

reported to be present at Nakitchivan, and other places on the Persian frontier. (*See* Map VII.)

It is not necessary to follow in any lengthened detail the progress of cholera in Russia in subsequent years. The Tables appended (Tables XIII.–XIX.) give the particulars as to times of appearance, duration of prevalence, sickness and loss of life from the disease, during the years 1871, 1872, and 1873. Here I propose to describe briefly the general distribution of cholera in the Empire during the period in question, and such dissemination and development as occurred beyond the limits of Russia. (*See* Maps V.–X.)

Russia, 1871.

In 1871 cholera was generally diffused throughout Russia in Europe. The disease extended from the north coasts of the Black Sea and the Sea of Azov in the south, to the south coast of the White Sea (Archangel) in the north, and from the Prussian frontier and Baltic coast in the west to the Ural mountains in the east. It spread also into Western Siberia, appearing in the government of Tobolsk on the $\frac{31 \text{ July}}{12 \text{ August}}$. It was reported also, to this Department, as having prevailed along the course of the Kuban in Caucasia, and as having appeared in Transcaucasia at Baku and Erivan. During the prevalence of cholera in European Russia this year it attacked 322,711 persons, and killed 124,881; in Poland it attacked 4,959, and killed 1,685; and in Western Siberia it attacked 1,130, and killed 371. The total seizures from the disease ascertained in the Empire this year were 328,800, the total deaths 126,937. (Tables XIII., XIV., XV.)

Prussia, 1871.

On the 13th July cholera passed the Prussian frontier in the government of Gumbinnen, on the route to Königsberg, "the chief northern outlet of the Russian Empire,"* where the disease broke out on the 24th of the month. A week later it appeared at Hamburg and Altona. Cholera underwent considerable development in several districts of the kingdom, the total number of attacks from the 13th July to the 8th November being 6,961, the total number of deaths 3,841. The disease was most severe in the government of Königsberg, where it prevailed from the 24th July to the 8th November, causing 3,868 seizures and 2,012 deaths. In Hamburg, from the 1st August to the 24th September, there were 171 cases and 101 deaths.†

* Mr. Rumbold, H.M. Secretary of Embassy, St. Petersburg.—*Commercial Reports*, 1871, p. 101.

† Cholera.—Prussia, 1871.

Districts.	Duration of Outbreak.		Cases.	Deaths.
	Beginning.	End.		
Gumbinnen - -	13 July	?	1,766	958
Königsberg - -	24 „	8 Nov.	3,868	2,012
Dantzig - - -	1 Aug.	7 Oct.	272	181
Marienwerder - -	21 „	7 Nov.	127	89
Berlin (city) - -	14 ,	14 Oct.	67	52
Potsdam - - -	20	25 „	116	71
Frankfort - -	29 „	21 „	74	61
Stettin - - -	11 „	21 „	333	212
Posen - - -	19 „	26 „	150	84
Schleswig-Holstein -	21 „	1 „	166	106
Lüneburg and town -	4 Sept.	2 Nov.	20	13
Merseburg - -	9 „	2 „	2	2

Sweden, 1871.

Further north, the disease appeared in August at Helsingfors, in Finland, where, until its cessation on the 18th October, there were 300 cases and 165 deaths. It extended also to the opposite coast of the Baltic, at Hernosand, causing there from the 10th September to the 22nd, 18 cases and 11 deaths. Gothenburg also and the neighbouring district were attacked, about the same time apparently, and 35 cases of cholera were recorded, of which 21 were fatal.

Extension to North America 1871.

On the 10th October an ill-furnished emigrant steam-ship sailed from Stettin, where cholera then was, for New York, touching at Copenhagen and Christiansand. About a week after this vessel had left Christiansand cholera appeared among the passengers, 610 in number. She put into Halifax, Nova Scotia, and introduced cholera into that city, and into the village of Chezet-cook, 25 miles north of Halifax.*

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* The following is a report of this introduction of cholera into Nova Scotia, by Dr. L. M. V. Lloyd, Deputy Inspector-General of Hospitals, communicated, by the Director-General of the Army Medical Department, to the *Lancet*, 17th February 1872, p. 226 :—" Chezet-cook is a small fishing village on the south-east coast of " Nova Scotia, and about 22 miles from Halifax; the inhabitants are French " Acadians. The steamship ' Franklyn ' (Captain Dyer) left Stettin on the 10th of " October, Copenhagen on the 12th, and Christiansand on the 15th of the same " month (which ports were reported to have been then healthy), bound for New " York, with some 600 German emigrants on board. She left with an insufficient " supply of water and coal, especially of the former, and had a very stormy passage. " On October 23rd, eight days after leaving Christiansand, the first death occurred, " date of first appearance of sickness not ascertained. Previous to the occurrence of " any sickness the water failed, and was supplied to the cabin passengers only, those in " the steerage having condensed water for cooking and drinking, and this was " brackish from the coil of the condenser being out of order. The emigrants were " confined below decks during the stormy weather. The vessel reached Halifax on " November 6th, 22 days from last port, and 14 days after first fatal case, short of " coal and water. Having had fresh supplies, she proceeded, after a short delay, to " New York, before anything was known of her sickly condition ; and it was only " after her arrival at that port that we learned she had some 40 deaths previous " to calling here. There are various reports as to the statements made by the " captain to the health officer ; they were, however, such as to deceive him, and to " warrant his permitting the ship to have communication with the town, for which " he is now under suspension pending the result of an inquiry by order of the " Dominion Government. I have not been able to learn whether the emigrants " had come from infected localities ; and as to the condition of the vessel, all I can " ascertain is that she was ' comparatively clean.' On the day of her arrival (the 6th) " a named Melvin went on board to supply her with water, and was similarly " employed on the 7th ; and went below decks to turn on the tap. He had pre- " viously been suffering from diarrhœa ; was seized on the 13th of November with " symptoms of Asiatic cholera, and died on the 14th, after 12 hours' illness. His " medical attendants at once pronounced the disease to be cholera and every pre- " caution was rigidly enforced; his clothes and bedding were burnt, and the house " thoroughly fumigated. No other case occurred. The disease was brought to " Chezet-cook by Dennis Lepiere, who had been employed coaling the steamer on " the 7th November ; he stood several hours on the gangway leading from the " vessel supplying the coal, and was engaged shovelling it into the steamer. It is " rumoured he got drunk, and was placed below decks of the steamer until sober ; " but this is uncertain. On the 13th of November he was seized with severe " purging, vomiting, &c., and was driven in a cab to his father's house at Chezet- " cook. The symptoms became worse after his arrival—cramps very severe, " intense thirst, extremities very cold and blue, &c. ; but he recovered slowly, and " in a few days could move about. On the 17th of November Mary Lepiere, " aged 34, who lived about a quarter of a mile from her cousin Dennis Lepiere, on " whom she attended for a night, was seized with symptoms similar to his, but more " severe ; cramps extremely severe, eyes turned up and sunken, hands livid, face " and lips blue, &c. On the 18th she died after 20 hours' illness. On the 18th " November Margaret Lepiere, aged 21, a strong healthy women, sister to Dennis " (No. 1), with whom she lived, was seized with similar symptoms, which were also " very severe, but from which she ultimately recovered. In this case there was " suppression of urine for four days. Bridget Lepiere, aged 40, married women,

On the opposite side of the Continent cholera was more widely scattered beyond the limits of Europe in the course of the year.

In September the disease broke out at Constantinople. Isolated cases were reported on the 20th of the month, and from the 26th September to the 24th December 3,158 deaths occurred.

In the course of October and November cholera appeared at several places on the Danube. On the 17th October the disease was present at Sulina, and in November 26 deaths were recorded at Tultcha. Galatz also was infected. At the beginning of November 10 cases and six deaths occurred at Samsun, on the southern coast of the Black Sea, and in the third week cases occurred at Trebizond. The same week also several cases occurred at Varna.

South of Constantinople three cases of cholera, of which one was fatal, took place on the 10th November in the lazaretto at Salonika ; and the following month the disease appeared at a village 12 miles distant from that town, following upon the return of persons from Constantinople, who had been detained in quarantine. At St. Jean d'Acre an outbreak occurred, of which the first case was a traveller coming from Constantinople, landed ill of cholera from a passenger steamer.

" previously in good health, was seized on the 19th November with symptoms of a " very severe nature. She had been attending the others, and had 'laid out' the " body of Mary Lepiere (No. 2) on the evening previous. She died on the 21st, " about midday. Her symptoms were so severe, and the panic so great, that her " body was abandoned before her death even by her husband. Sarah Lepiere was " attacked on the same day as her sister Margaret, namely, on the 18th. She lived " in the same house, was only five years of age, and, although severe, the case " recovered. The symptoms were nearly the same in all the cases: cramps very " severe, vomiting and purging of 'rice-water stools,' patients absolutely pulseless, " eyes turned up and sunk in the socket, upper lip contracted, the 'risus sardonicus,' " intense thirst, face swollen, lips blue, and arms blue from elbows to the tips of " the nails; and one case, No. 3, had suppression of urine for four days. No sectio " cadaveris was made. After death the legs and thighs were flexed to an extreme " degree, face swollen and blue, nose pinched, upper lip retracted, arms blue, hands " clenched, &c. The rigor mortis was so extreme that the coffin had to be made to " adapt itself to the curvatures of the body. No medicines were of any avail, as " the stomach rejected everything. Very weak brandy and water, administered " frequently in small doses, seemed to be most useful. The suppression of urine in " case No. 3 was overcome apparently by hot baths. The disease did not extend " beyond the Lepiere family, I believe, owing to the very energetic manner in which " all needful sanitary measures were enforced. Drs. Jennings and Rigby on being " sent down by the Government enforced the strictest quarantine. Sentries were " placed on every road at the distance of five miles from the village, not even the " mails being allowed to pass, and ships were not allowed to approach the coast. " The dejections from the patients were received into vessels in which were placed " carbolic acid, chloride of lime, &c., and were covered with these and with earth " before being buried. The infected houses were also quarantined from the rest of " the village. The bedding, clothing, &c., were all burned; and the furniture, " houses, &c., thoroughly disinfected and scrubbed. For the facts embodied in this " report I am indebted to the health officer of the port, and to the medical gentle- " men in attendance on the sick. No case of Asiatic cholera had appeared in " Halifax since the spring of 1866, when the steamship 'England' arrived in a " sickly condition, and suffered severely. That the disease was imported by the " 'Franklyn' there can be no doubt. Some of the passengers most probably came " from an infected district; and all were placed under the most unfavourable con- " ditions, using brackish water, and being confined below in bad weather, conditions " predisposing to, and favouring the spread of, the disease. The men Melvin and " Lepiere, employed at the same time in coaling and watering, were exposed for " some hours to the poisoned air on board of, or escaping from, a ship in which " some 40 deaths had occurred during the previous fortnight, and both took ill the " same day; one case proving fatal in 12 hours, and the other communicating the " disease to members of his family, all which facts, it must be admitted, clearly " prove the propagation of the disease by infection."

In November also the disease appeared at Ismid (Nicomedia), on the Asiatic coast of the Sea of Marmora.

1871, *Anatolia.*

But before cholera had appeared at Constantinople, and before there had been any extension of the disease beyond the limits of European Russia, the disease seems to have been present in parts of Asia Minor. At the commencement of August cholera broke out at Brusa, in Anatolia, in succession to appearances of the disease in villages south of the city. These appearances are believed to have begun in June at Harmandjik, a town 36 hours south-east of Brusa. Late in November the disease was reported to be present at Kutaya, 80 miles to the south-east of Brusa, and in December it appeared at Amassia, and in Roum. The latter outbreak may have been connected with the introduction of cholera into Samsun the previous month; but at the time of the believed appearance of cholera in the district between Brusa and Kutaya, cholera is not known to have been prevalent nearer to this locality than Southern Russia or the north of Turkish Kurdistan.

1872, *Russia.*

In the year 1872 cholera was almost as widely spread in European Russia as in the previous year. In 1871 the disease was prevalent in 49 governments, in 1872 in 46. Bessarabia, which escaped the epidemic the former year, suffered in 1872; while Archangel, Vologda, Courland, and Livonia, which were then infected, now were free from the malady. The seizures during the year were 310,607, the deaths 113,196, as compared with 322,711 and 124,831 in the previous year. Poland, of which four of the governments had suffered from the epidemic in 1871, had the disease prevalent in eight in 1872. In the latter year the seizures in this kingdom were 12,033 [? 15,749], and the deaths 5,280 [? 5,597]; in the former year the seizures had been 1,130 and the deaths 371. (See *Appendix*, Tables XVI. and XVII.)

1872, *Austria.*

This year cholera invaded Central Europe from Russia through Galicia. To the westwards there seems to have been a slight scattering of the disease only. It reappeared at Helsingfors in July; and a group of eight cases, six of which were fatal, occurred at Gefle, on the Swedish coast, between the 28th August and the 9th September. Two cases also, one of which was fatal, occurred at certain ironworks a mile from this port. In East Prussia and Prussian Silesia there was a scattering of cases from infection across the Polish frontier. On the eastern extremity of the Russian frontier cholera passed into Rumania, spreading over several districts of Moldavia. During this prevalence in Rumania 1,093 attacks were recorded, of which 524 died. (See *Appendix*, Table IV.)

Cholera entered Galicia on the 29th May 1872, and spread over that province and the Bukovina, extending westwards into Moravia and Bohemia, and southwards throughout Hungary. With the exception of the Bukovina the disease continued active in these provinces until late in the following year (1873). The official summary returns do not separate the sickness and loss of life of the two years, and these will be given in the account for 1873. In the Bukovina, cholera appeared on the 3rd August and ceased on the 28th November. Within this period there were 1,689 cases of the disease, of which 724 died.

1873, *Russia*

In 1873 cholera reappeared in 14 governments only of European Russia; but in Poland and Central Europe the disease increased in intensity, and it now spread over a considerable portion of Western, and some parts of Southern Europe.

The number of cases of cholera in European Russia this year was 9,847, the number of deaths from the disease 4,395. The number of cases in Poland was 63,491, the number of deaths 29,733. The disease in European Russia prevailed most in the governments of Volhynia, Grodno, and St. Petersburgh; in Poland in the governments of Warsaw, Keletz (where the mortality was 11·3 per 1,000 of population), Lublin, Petrokov, and Sedletz.

The sickness and loss of life in Austria and number of localities in which it prevailed is shown in the following table:—

Austria, 1872–1873.

Austria, 1872-73.

Provinces.	Duration of Outbreak.		Number of Localities attacked.	Population.	Cholera.	
	Beginning.	End.			Cases.	Deaths.
Galicia - -	29 May 1872.	31 Sept. 1873.	3,611	4,098,319	243,680	94,766
Bohemia -	28 Nov. 1872.	31 Aug. 1873.	110	363,915	6,532	3,588
Moravia -	3 „	30 Sept. 1873.	119	249,695	3,140	1,488
Silesia - -	28 „	20 Aug. 1873.	81	85,790	1,594	647
Lower Austria	4 April 1872.	29 Nov. 1873.	164	424,247	6,533	3,232
			4,085	5,221,966	261,479	103,721

In Vienna, (population 657,100,) from 4th January to the middle of November (the epidemic extension commencing in July), the number of cases of cholera registered was 2,854, of deaths from the disease, 2,123.

Hungary, 1873.

Hungary suffered to a greater extent from this invasion of cholera than Austria. From September 1872 to December 1873, there were attacked by the disease in this division of the Austrian Empire, 6,507, towns and villages, and in 231 of these places cholera had not wholly ceased when the year 1873 came to an end. Within this period, among a population stated to number 8,675,517, there were 443,641 cases of cholera, of which 187,407 were fatal. In Buda-Pesth, from the 18th October 1872 to 15th October 1873, there were 6,705 cases of cholera, and 3,159 deaths from the disease.

Austro-Hungary was the principal seat of prevalence of cholera in Central Europe in 1872, as it was in 1873. From this area of prevalence, and from the Polish frontier, the disease radiated more or less in all directions eastwards, southwards, and westwards. Passing along the valley of the Danube from Hungary, it attacked the principal towns on both banks of the stream, (Widin, Rustchuk, Silistria, Braila, and Galatz,) and spread into the districts on both sides. On the Rumanian side, within the Principalities, it attacked 11,516 [? 11,696] persons, and killed 3,864 [? 3,845]. (*See* Appendix, Table V.) On the Bulgarian side no proper records of its extension, and of the sickness and mortality arising from it, were kept. The disease appeared at Rustchuk during the first week of June, where it was most severe among the

Rumania, 1873.

Turkey, 1873.

troops stationed there. Subsequently it broke out in a large camp of exercise at Shumla, south-east of Rustchuk, in the interior, and afterwards in the town and neighbouring villages. According to the imperfect and untrustworthy records kept, there were 315 deaths from cholera among the troops, 407 deaths among the civil population of the town, and 521 deaths in neighbouring villages. Cholera was also conveyed into other parts of the interior, and appeared at Sophia, and in August in two or three localities of the vicinity of Salonika, to which it seems to have been propagated from the interior.

On the Bosphorus, in the lazaret at the northern entrance, several cases of cholera were received from ships arriving from ports on the Danube, and the disease was propagated to some of the guards and attendants. Two soldiers, moreover, were attacked with cholera in Constantinople immediately after being freed from quarantine, but the cases were sterile.

1873, *Southern Austria.*

South of Hungary, where cholera had been prevalent, on the right bank of the Save, along the Austrian military frontier, the disease ascended the valley of the Unna, attacking Dubitza at the foot, and Bihacs at the head, killing altogether about 1,000 persons. West of Bosnia, the Austrian ports of Trieste and Fiume both suffered from the epidemic, the former from the 13th August to the 20th November, having 620 cases and 353 deaths among a population of 120,000. Further west cholera crossed the Venetian frontier from Hungary into Italy, and from Venetia it passed into Lombardy and Parma, and reaching Genoa in August was propagated to Naples in September. In Venice, cholera appeared on the 24th June, and lasted until 10th October, during which period there were 800 cases and 459 deaths. Elsewhere in Italy, except in Naples, so far as my information extends, the local outbreaks were few in number and not of much magnitude.*

The westward extension of cholera this year included Prussia, Saxony, Bavaria, Wurtemburgh, North-western France, and to some extent Belgium and the Netherlands.

1873, *Prussia.*

In Prussia not less than 23,242 lives were sacrificed by the disease in 1873, out of 45,589 persons attacked.† In the kingdom of Saxony there

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* I have not been able to obtain any general report for this year, such as the reports published relating to the diffusion of cholera in 1865–67 in Italy, and have even been foiled in my attempts to ascertain whether such a report has been printed by the Italian Government.

† Cholera.—Prussia, 1873.

	Cases.	Deaths.
Province of Prussia - -	25,261	13,268
„ Brandenburg - -	3,594	1,721
„ Pomerania - -	529	351
„ Posen - - -	1,429	776
„ Silesia - - -	3,667	1,773
„ Saxony - -	10,246	4,834
„ Schleswig-Holstein -	228	156
„ Hanover - -	578	346
„ Hesse-Nassau - -	57	17
	45,589	23,242

(Quoted from the *Staats Anzeiger* in the *Gazette Hebdomadaire de la Médécine et de Chirurgie* for the 2nd January 1874.)

were 766 cases of cholera and 361 deaths from the disease.* Cholera appeared in Munich on the 25th June, and during the six following months (the outbreak continuing into 1874), there were 2,027 cases of the disease in the city, of which 934 were fatal. Other towns in Bavaria did not entirely escape from the epidemic. In Wurtemburg the disease showed itself at Heilbronn, and in few neighbouring places, the total attacks amounting to 168, the total deaths to 78. The extent of prevalence of the disease in France is very imperfectly known. No official account of the extension there has been published, and the Report of the Academy of Medicine on the epidemics of this year has not yet appeared. According to a report, by Dr. Denis Dumont, on cholera in the department of Le Calvados, the disease appeared there this year in the Commune of Bretteville-sur-Lame on the 15th July, causing from that date to the 5th August 30 deaths. Other Communes in the Department suffered slightly, Ifs, (7 deaths), Gayelles, Oyestreham, (18 deaths), Bretteville-sur-Oder, (9 deaths). The disease appeared in Caen on the 24th August, and from that date to the 8th November it is estimated that there were 1,086 cases, and 497 deaths.† In July, also, a fatal case of Asiatic cholera was reported on an English vessel at Rouen, and soon after the disease was reported to have broken out in Havre. The presence of cholera in this port was not officially recognised until some time afterwards. The disease continued here until the 11th December but no complete account of the sickness and mortality has been published. Cholera appeared in Paris on the 5th September, and continued there three months, causing 855 deaths.

Bavaria, 1873.

Wurtemberg, 1873.

France, 1873.

In Belgium cholera appeared at Antwerp on the 20th September, and caused in the three following months 135 cases and 86 deaths. There was a scattering of the disease in several provinces of the Netherlands, but no serious prevalence. Hamburg suffered from a sharp outbreak, which, beginning on the 21st June and ending on the 8th November, attacked 1,483 persons, killing 1,002. Denmark escaped from the diffusion, although cases were imported into Copenhagen. Eleven deaths from cholera were reported in Lubeck. On the eastern side of the Sound, in Sweden, 561 cases of cholera, of which 275 were fatal, occurred in the district of Helsingborg and parishes of Höganas and Wäsby. Further north, in Norway, there were 20 cases of cholera and 10 deaths from the disease in Bergen and the neighbourhood, during August and September. Still further to the north, in the district of Helsingfors, Finland, eight cases of cholera, five fatal, were reported at Joensun.

Belgium, 1873.

During this prevalence of cholera in Western Europe, England did not escape numerous importations of the disease, all of which proved sterile. In July several cases were imported into London and the Thames from Rotterdam. In September cases were imported into the Thames, into London, and into the ports of Southampton and Swansea from France. In October a case was imported into London direct from Prague, and

England, 1873.

* Cholera.—Kingdom of Saxony, 1873.

Government.	Cases.	Deaths.
Dresden - -	683	322
Bautzen - -	22	11
Leipzig - -	37	25
Zwickau - -	4	3
	766	361

In the city of Dresden the cases numbered 156; the deaths 99.

† Rapport sur l'Epidèmie Cholérique de 1873 dans le Calvados. Par le Dr. Denis-Dumont Caen, 1874.

END OF THE DIFFUSION BEGINNING IN 1865.

the same month several cases were imported from Havre into Liverpool, some by way of Southampton and thence through London by rail to Liverpool, others by ship direct into the Mersey.*

When the year 1873 came to a close cholera still existed in Russia, in the Governments of Grodno and Mohilev; in the Netherlands, at Rotterdam; and in Munich. In Russia the disease became extinct in January 1874, the latest cases being reported in the Government of Mohilev. Eleven cases of cholera, six fatal, were reported in Rotterdam from the 1st to the 21st January 1874. On the 1st April a fatal case was also reported, since which date the disease appears to have ceased in that port. In Munich cholera had continued throughout the winter and into the spring of 1874. During its prevalence in the city, this year, the seizures were 1,016, the deaths 526, making from the commencement of the outbreak in June 1873, to its close in April 1874, the total number of attacks 3,040 and of deaths 3,060, among an estimated population of 170,000. In February, 1874, cholera was active in several localities of Prussian Silesia. Fifty deaths were reported, early in April, to have occurred in this province. On the 9th July the *Journal de St. Petersbourg* quoted a statement, from the Russian Academy Gazette, that cholera had broken out in several places in Poland. Dr. Arkhangelsky, in his observations on the prevalence of cholera in European Russia in 1873, and the extinction of the disease in that country at the beginning of 1874, makes no reference to Poland.

Of the further progress of cholera in Prussian Silesia and Poland in 1874 I know nothing, and such inquiry as it has been possible for me to

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* The following facts, relating to the spread of cholera in Europe in 1873, illustrate the difficulties attending the imposition of an effective quarantine, and the necessary failure of quarantine restrictions where active and rapid communication is maintained between countries. The first intimation of the eastward movement of cholera in Europe in that year (cholera having been present throughout the whole of the winter of 1872–73 in parts of Austrian Silesia, Bohemia, and Hungary) was given in a telegram from Her Majesty's Representative at Constantinople, dated the 10th May 1873, and which conveyed the information of the presence of cholera in Widdin, the establishment of a *cordon sanitairè* there, and the imposition by the Ottoman Board of Health of quarantine on arrivals from the Upper Danube. Subsequent communications from Constantinople showed that 34 cases of cholera, 15 ending fatally, had occurred in Widdin between the 26th April and the 12th May 1873, and that the disease had prevailed at Lom (Bulgaria), beginning in February and ending at the close of April.

The first intimation of the westward movement of cholera in Europe, the same year, was contained in a telegram from Gumbinnen, East Prussia, published in the *Times* of the 4th June, and which announced the appearance of the disease in two villages of West Prussia. The first official intimation of the movement of cholera westward was forwarded from Danzig, by Her Majesty's consul there, on the 5th June. The despatch recorded the appearance of cholera among raftsmen of the Vistula, in that portion of the navigation which lies between the mouth of the Vistula and the entrance to the canal leading to Danzig. Cholera first appeared in West Prussia on the Vistula, in the government of Marienwerder, on the 26th May.

The first intimation of the presence of cholera in St. Petersburg was received on the 9th September, the disease having appeared there on the 10th August. Cholera was officially recognized in Havre on the 2nd September, the disease having been present there since the 9th August, and after a formal contradiction of the reported presence of the disease on the 29th August. The first intimation of cholera in Hamburg was received on the 1st August, after inquiry made from this country, in consequence of several cases of cholera having been landed at Blackwall, from a ship which had sailed from Hamburg on the 26th July. Cholera had been present in that port since the 21st June. Information was received of cholera in Rotterdam on the 18th October, but its existence there was not officially declared by the local authorities until the 27th October. Information was received of the presence of cholera in Antwerp on the 25th October, but at that date clean bills of health were still being issued to ships leaving the port.

make has failed to the present in eliciting information on the subject. Presumably, having regard to the sources of information which were accessible in 1874, notably during the meetings of the International Sanitary Conference at Vienna that year, the disease died out in Prussian Silesia and Poland before the year came to an end. Practically, so far as the epidemic diffusion is concerned, of which these later manifestations were the fag end, such was the case. (*See* Maps V.–X.)

§

Observations on the Origin of the Recurrence of Cholera in Europe in 1869.

The recurrence of cholera in Europe, beginning in 1869 and ending in 1874, which I have described, was one of a series of phenomena of like character.

In 1868, as already related (p. 108), after a general movement from westward to eastward in Persia, and during a period of declining prevalence, cholera became exceedingly active in that country. Breaking out at Meshed, also at a time of pilgrimage, the disease soon spread from this city, as a centre, once more over the country, returning upon the steps of the previous diffusion, so to speak, and passing at more than one point beyond the limits of Persian territory.

Preceding this recurrence of cholera in Persia, there had been the previous year (1867) a great extension of cholera in Northern India and Afghanistan. In 1865–66 the North-western provinces were newly invaded by migrating cholera from the Lower Provinces, and in the latter year the invasion included the Southern Punjab. In 1867 the invasion extended throughout the Punjab and into Eastern Afghanistan. The great Hindoo religious fair at Hurdwar, on the Upper Ganges, where the river issues from the mountains, exercised an important influence upon the diffusion of cholera in Northern India this year. The fair was held in April, and it is estimated that the extraordinary number of 2,800,000 persons were present on the principal day of the religious rites. At the close of the fair, cholera broke out among the assembled multitude as they were about to disperse, and it clung to the different bodies returning homewards, and was disseminated by them along the different routes they travelled. In July 1867, cholera broke out in Cabul, and prevailed in that city with such intensity that not less than 8,000 lives are estimated to have been lost from the disease in the period of a month or thereabouts. The disease extended to the country surrounding Cabul, the villages there suffering from it proportionately to as great an extent as the city. Towards the close of August, cholera had considerably decreased in Cabul, and business, which had been suspended while the severity of the outbreak was greatest, was resumed. Under the alarm of the outbreak, the bazaars had been closed, and the distress arising from cessation of trade was added to the miseries of pestilence. Early in August tradesmen were ordered to re-open their shops, under a penalty of 25 rupees for neglect of obedience.

Of the further progress of cholera in Afghanistan there is no information from the 2nd September, when the disease was still present in Cabul, to the beginning of 1869, when, under date January 4th, it was reported, from Meshed, that the malady was very fatal in Herat, destroying there 200 people daily.

The recurring epidemic activity of cholera in contiguous countries in successive years, each recurrence being notably characterised by diffusiveness through the agency of moving bodies of people, would on the first aspect, and having regard to the common facts of diffusion of the disease, hardly be regarded as disconnected phenomena. Inspector General Dr. John Murray, and others who studied the diffusion of cholera in Northern India from Hurdwar in 1867, while the diffusion

was in progress, came to the conclusion that they were witnessing the beginning of another pandemic extension. Dr. Murray constructed an hypothetical route of the probable progress of the disease beyond the Indian frontier, now before me, so certain did he feel of the migration reaching to Europe. On the other hand Dr. Tholozan, the physician to the Shah of Persia, studying at Teheran the recurrence of cholera in Persia in 1868, and wholly unaware, at the time of the great extension of the disease in Northern India and Eastern Afghanistan the previous year, came to the conclusion that the recurrence was a recrudescence of the cholera already existing in Persia. In like manner, Russian physicians, represented by Dr. Pelikan, the Director of the Imperial Medical Department, studying the outbreak of cholera at Kiev in 1869, irrespective of the remarkable recurrence of the disease in Persia the previous year, came to the conclusion that that outbreak was a recrudescence of the still unexhausted epidemic which had begun in 1865, and of which there were some traces in the province of Kiev the preceding year (1868).

Approaching the study of the recurrences in Persia and Russia from the ascertained local facts alone, and on the assumption that the great epidemic of 1852–56 in Europe was of European origin, there is much to be said in support of the opinions of Dr. Tholozan and Dr. Pelikan.

Cholera in its course through Persia from west to east, appeared in Meshed in December 1867. The next year 1868, at the time of pilgrimage, the city was liable to repeated introductions of the disease from the infected provinces of Mazanderan and Astrabad (where cholera had existed widely the previous years, and had again become active in the spring of 1868), and, thronged with pilgrims, it presented conditions highly favourable to an exceptional development of the disease.

At Kiev, in 1869, cholera also re-appeared at a time when the city was crowded with pilgrims from all parts of the Russian Empire. When the disease first showed itself, and for some time afterwards, it was believed to be *cholera nostras*, so little did the local physicians suspect the existence of any remnants of the preceding epidemic in the province or liability to infection from cholera newly migrating from the east. When the epidemic nature of the malady became obvious, the apparent freedom from cholera of the immense tract of country lying between Kiev and the Persian frontier, preceding the outbreak, seemed to preclude any conception of infection from that source ; and on the other hand, the existence of the disease in parts of the province of Kiev in 1868, seemed to indicate certainly a source in recrudescence of an unexhausted epidemic.

If the conclusions of Dr. Tholozan and Dr. Pelikan are confirmed respecting the origin of the recurring cholera of 1868 in Persia and 1869 in Russia respectively, the remarkable problem is presented for consideration *of the successive development in successive years of three great original diffusions of cholera in contiguous countries, each diffusion unconnected with the other by the transmission of the disease through the agency of infected persons from one region to the other* (*such transmission obtaining amidst the various localities within the area of each diffusion*).

The problem, so far as I am aware, is unique in the history of cholera, and before it can be approached with hope of successful solution, it is necessary that any doubt which may rest upon the observations out of which it arises should be fully removed. In other words, until it is shown that the conclusions of Dr. Tholozan and Dr. Pelikan are cleared from such sources of fallacy as may beset them, they should not be accepted without much reservation. Obviously the conditions under which the inquiries which led to the conclusions were made here

become a matter of primary importance. I have already observed that Dr. Tholozan, when he formed the opinion that the outbreak at Meshed in 1868 was solely a recrudescence of the epidemic cholera which had invaded Persia from the west in 1866, was unaware of the invasion of Afghanistan by cholera from India the preceding year (1867). The relation of this prevalence of cholera in Afghanistan to the re-awakened activity of the disease in Persia the following year, except chronologically, is absolutely unknown. Equally unknown is the period of appearance of the disease at Herat, and its relations to the outbreak in Cabul on the one hand, and in Meshed on the other. It may be that the disease died out in Eastern Afghanistan during the severe winter of 1868; but it may be also (and this is perhaps more probable, having regard to the activity of the disease in July and August in Cabul and the vicinity) that its onward course was not arrested there, but that it spread into westward Afghanistan. Persia was, in fact, exposed to certain definite chances of a new invasion of cholera along the route from Herat to Meshed late in 1867 and at the beginning of 1868, and the recurrence of cholera in Meshed in the latter year may have been due either to recrudescence of the declining epidemic in Persia, or to the importation of freshly migrating cholera from India or to both these sources, the recrudescence masking the new migration. This overlapping of epidemics of cholera, so to speak, is not an unknown phenomenon in India.

It is no part of my purpose to attempt to answer this question. I have for object simply to show that before the theory of recrudescence can be accepted, as accounting fully for the phenomena of recurrence and increased epidemic diffusiveness of cholera in Persia in 1868, the possibility of a new invasion of the disease from India having occurred must be eliminated. This, unfortunately, regard being given to the difficulties which beset inquiries of the kind in Persia and Afghanistan, is a remote chance, and the doubt I fear must remain, unless some unexpected source of information become available.

A not unlike doubt rests upon Dr. Pelikan's conclusion as to the recrudescence at Kiev in 1869. The chronological relation of the outbreak in this city to the increased activity of cholera in Persia in 1868, as of that increased activity to epidemic prevalence of the disease in Afghanistan and Northern India the preceding year, had early arrested the attention of English observers. Dr. Pelikan's opinion and the opinion of local observers on the source of the outbreak, as first communicated to the Academy of Medicine, Paris, by Dr. Fauvel, appeared to have been formed without such examination into its relationship with preceding cholera in Persia as appeared to be called for, and without reference to the curious chronological sequence of the outbreak (if known to them) to the epidemic activity of the disease in Northern India and Afghanistan in 1867. In September 1871 Mr. C. Macnamara* had directed attention to the increasing facilities of communication between Russia and Persia, through Caucasia, in relation to the outbreak; and in 1872, looking at the subject from an independent point of view, I had ascertained that much of the Persian trade with Russia had, since 1867, been diverted from the Trebizond route previously followed, and been transferred to a shorter and more quickly traversed route through Transcaucasia to Poti and thence to Russia. With a view of eliciting information, I prepared a report on the subject of the chronological relationship of the outbreak at Kiev with cholera in Persia in 1868 and in India in 1867; and in

* *Indian Medical Gazette, September* 1, 1871.

regard to the trade route between Persia and Russia through Transcaucasia I observed :—

"The re-appearance and diffusion of cholera in South Russia in 1869–71, following close upon or accompanying the most considerable prevalence of cholera in North Persia since the diffusion of the disease in both countries in 1865–67, and also upon the development of a comparatively direct and more quickly traversed route of traffic between Persia and South Russia, is certainly a remarkable coincidence, one of those coincidences, indeed, which, if thoroughly examined, may lead to important results. The data in my possession help little towards such an examination. As I have already remarked, the locality of the reappearance, Kiev, and the absence, so far as I am at present aware, of any extension of cholera across the Russo-Persian frontier, in 1868 and 1869, and, I would add, of its appearance in any of the ports of South Russia, prior to the outbreak at Kiev, seem at first sight to present an insuperable difficulty to the assumption that the diffusion of cholera in Northern Europe in 1869–71, might be an extension of the disease from Persia. But I would observe first, that this difficulty may arise largely from the imperfection of the data at my command; and next, in respect to Kiev, that this city was connected by railroad with Odessa in 1869. Railway communication, I may also state, was opened the same year between Taganrog and Kursk. The facility and rapidity of communication effected by steam, both on land and at sea, unquestionably exercise a very important, and not at all times easily understood, influence upon the dissemination of cholera. In 1866, cholera, in an undetected form, was carried from districts of Germany, by way of Hamburgh, across the German Ocean and this country, and across the Irish Sea, four days' sail into the Atlantic in the case of the steamship "England," and six days' sail in the case of the steamship "Virginia," before it showed itself in its well understood character. Facts like these prove that when the disease appears in the interior of a country, at a distance from a region where it is prevailing epidemically, and even separated from that region by an intervening sea, considerable caution must be exercised before coming to the conclusion that the malady was not imported, if the seat of outbreak in the interior is in free communication with the coast, and with the infected region.

"But, adopting Dr. Pelikan's statement that cholera had never been extinct in Russia, from the introduction of the disease in 1865 to the outbreak at Kiev in 1869, the question arises whether there may not still have been, as was probably the case in Persia in 1868, a re-importation or re-importations of the disease from Persia in 1869 or 1870, which determined its renewed diffusiveness in the latter year and in 1871.

"I have not the data, however, which would permit me to discuss this question. My present object is to direct attention to the coincidence of the outbreak in South Russia in 1869, with the wide prevalence of the disease in North Persia, and the establishment of a direct, and more rapidly traversed route of traffic between South Russia and Persia. I suggest that a more probable explanation of the outbreak in South Russia in 1869 or 1870, and of the subsequent large diffusion of the disease in Northern Europe, is to be sought in the movement of cholera, in some way as yet unknown, along this route into Russia, rather than in the assumption, less consistent with our knowledge of the sources of epidemic diffusion of the disease beyond the limits of India, of the recrudescence of the well-nigh extinguished epidemic of 1865." *

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* Report on Recent Diffusion of Cholera in Europe. *Parliamentary Paper*, 8th July 1872.

This report was communicated to the Russian Government, and in a memorandum upon it Dr. Pelikan furnished the details of the outbreak at Kiev which have already been quoted (see page 120); and with respect to the suggested connexion between that outbreak and cholera in Persia, he observed :—" The places in Persia and Russia attacked by cholera were " separated from each other by an immense space entirely free from " cholera, so that the idea of any genetic connexion between the epi- " demics which visited those localities falls of itself to the ground." With respect to the Transcaucasian trade route he further observed :— " This new commercial route has until the present time been of such " little importance as to have exercised scarcely any influence on the " movements of trade along the old route."

I am unable to reconcile Dr. Pelikan's statements that the new commercial route at the period referred to had exercised a hardly appreciable influence upon the movements of trade, with the large increase in the value of the imports across the Transcaucasian frontier in 1868 and 1869, the value of the imports at Astrakhan remaining virtually stationary.*

Dr. Pelikan may simply have meant to convey the impression that the " establishment" of this route indicates only the period when the Russian Government first gave particular attention to its development, and that it does not mark the beginning of any greater flow of traffic along it. I had to regard the coincidence of its establishment with the formation of a new epidemic centre of cholera in South Russia and the wide prevalence of the disease in North Persia, in the light of previous active migration of cholera from India into Afghanistan, and from East Persia into North Persia. The coincidence remains, and it is clear that it was not present to the minds of Russian physicians at the time of the reappearance of cholera at Kiev in 1869.†

Concerning this route I said in the Parliamentary Paper previously referred to :—" The establishment of the route by way of Poti and the " ports of South Russia as the principal line of traffic between Persia " and Russia is a matter which seriously affects the sanitary welfare of " Europe, particularly when considered in connexion with the develop-

*Table showing the Total Value of Imports for Home Consumption by the Transcaucasian Frontier, by Astrakhan, and by Baku, during the six years 1865–69.

Frontiers.	Average Annual Value of Imports, 5 years 1859–63.	1865.	1866.	1867.	1868	1869.
	Sil. Roubles.	Sil. Roubles.	Sil. Roubles.	Sil. Roubles.	Sil. Roubles.	Sil. Roubles.
Transcaucasian Frontier.	5,451,457	7,599,388	8,338,212	8,732,093	9,050,722	10,716,147
Astrakhan - -	1,050,387	1,373,606	1,569,034	1,285,701	1,180,000	1,470,000
Baku - - -	(1863) 741,756 (1864) 1,784,352	780,000	812,000	903,000	486,000	764,000

† Of the new Transcaucasian route, Mr. Consul Palgrave states in his Report on the trade of Trebizond in 1873 :—" To this important line of communication with " Central Asia the Russians first paid serious attention in 1867, and have since " shown the greatest diligence in perfecting both the line itself and the means of " transport. The progressively increasing gains of the new route have been the pro- " portionate losses of the old one ; and the completion this autumn of the railway from " the coast to Tiflis has accelerated the process. Should the Russian administration " continue the line to the Persian frontier, as it intends doing, the Persian transit " viâ Trebizond will be reduced to utter insignificance."—(" Reports of Her " Majesty's Consuls," Part 3, 1873, p. 1847.)

"ment of railway communication between Central Europe and the "Russian coast of the Black Sea. By the completion of the line of "railway between Odessa and Kiev in 1869, continuous railway com- "munication was established through Russia. between Northern "Germany, and the principal Russian port on the Black Sea; and, by "the recent completion of a railway between Odessa and Jassy, the "former place has been brought into connexion by way of Cernowitz, "with the railway system of North Germany and Western Europe, and "a direct railway route established between the coasts of the North Sea "and of the Black Sea. In proportion as the projected line of railway "between Poti, Tiflis, Elizabethpol, and Baku, is carried out and "brought into operation, the present augmented speed of traffic between "Persia and Russia will be further accelerated and Persia be brought "into closer connexion with Europe. With the completion of the "Transcaucasian Railway it may be anticipated that this will follow "(to use a phrase of the Medical Officer applied to the relation of the "Continent to this country in respect of infectious diseases), namely, "contagions current in Persia will become current in Europe."

The Poti-Tiflis section of the projected Transcaucasian railway was opened for use partly in 1871, and throughout its entire length in the summer of 1872. In 1873 a weekly steam-service was established between Constantinople and Poti by Persian merchants* ; and on the 25th September 1873 the ceremony of turning the first sod of the first railway in Persia was held at Resht in presence of the foreign consuls and merchants.†

But I am chiefly concerned with the fallacy which underlies Dr. Pelikan's assumption that mere distance, the intervening space being free from cholera, is sufficient, irrespective of other considerations, to establish the absence of any genetic connexion between the re-appearance of cholera at Kiev in 1869, and the prevalence of the disease in North Persia.

The experience of this country since 1865 has tended to show that cholera may be carried greater distances in a latent or undetected form than had previously been suspected. The instances I have already quoted of bodies of emigrants travelling from infected districts of the Continent across the German Ocean, and across England, several days sail out into the Atlantic Ocean, before any sign of cholera was manifested among them, are peculiarly instructive with regard to the question now under consideration. Not less instructive is the instance of cholera being carried from Odessa to Altenburg in 1865. Even more instructive is the history I have given, in the present report, of the relationship of the outbreak of cholera at Southampton, in 1866, to, at the time, wholly unsuspected existence of cholera in Alexandria. I cannot be assured that these instances exhaust the possibilities of distant carriage of cholera in an undetected form. I draw no parallel between the conditions of transit in the instances I have mentioned, and the conditions which exist on the different routes from Persia to South Russia. But it is not to be forgotten that (putting aside the question of the new route) the facilities of communication between Persia by way of the Caspian and the Volga, and from the Volga into the valley of the Don, and thence into Southern Russia were even in 1868 considerable. Astrakhan maintained systematic communication with the Persian coast of the Caspian by steam navigation, during the period of open sea (April to October). Communication was maintained both on the Volga and the Don by steamers, and a short line of

* The *Malta Times*, quoted in the *Times* of 15th October 1873.
† Reuter's Telegrams, the *Times*, September 26th, 1873.

railway between Tzáritzin on the former river, and Kalatch on the latter, connected the traffic of the two streams. From Rostov (on the Don), Kiev was accessible by railway. Kiev in fact, in 1868, was no more remote from the most distant part of the Persian coast of the Caspain, Ashurada, than continuous steam-traffic communications, traversed in a period of time less than three weeks, admitted of.

Again, Dr. Pelikan's statement of the "entire freedom" from cholera of the tract of country intervening between Kiev and North Persia must be read in the light of the means which existed of obtaining information on this subject. It may be at once conceded that there was no such presence of the disease in this tract as marked the migrations of cholera through it in 1830 and 1847. It is not easy to conceive that more than this could be implied. At the period in question the means for ascertaining the existence in Caucasia, beyond the great towns and military posts, of any manifestations of disease were of the most imperfect description. There was hardly a pretence of a registration of deaths,* and the paucity of medical men in the province (greater here, perhaps, than in the conterminous districts of Russia) made even a general knowledge of the prevalence of sickness hardly possible. Moreover, the districts on the borders of the Caspian (Daghestan, Shirwan, Tallish) are principally occupied by Shiah Mahommedans, of whose conditions as to sickness as little is known as of their co-religionists in Persia. Indeed, M. Sobestiansky, writing of the diffusion of cholera in these districts in 1872,† is compelled on this account to limit himself almost entirely to its manifestation in the military posts. Again hardly more, if any more, is known of the states of sickness among many tribes occupying the central mountain districts and the valleys of the Terek and the Kuban. The imperfect knowledge of the progress of cholera in the Caucasia is well understood in the province, and the Imperial Medical Society formed there is at present engaged in endeavouring to recover more satisfactory details on the subject. Until this important work is completed, the state of cholera in Caucasia in 1867, 1868, and 1869 must remain an open question; and it will be doubtful, even then, whether an inquiry made some time after the period under present consideration will remove doubts which could only have been properly dissipated by specific inquiry instituted at the time.

The imperfect knowledge in Russia of cholera in Caucasia is most suggestively shown in Dr. Arkhangelsky's work. The blanks here with reference to the province are numerous and important. The Government of Caucasia does not appear to communicate systematically, if at all, to the Medical Department of the Imperial Government such

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* It is only since 1870 that even in the capital towns of the empire a registration of deaths and causes of death would appear to have come into operation. Writing of St. Petersburg, Dr. Hübner observes:—"Les recherches sur l'état sanitaire de St. Petersbourg en mode statistique ne furent entreprises qù'à partir de l'an 1870 immediatement après le dernier inventaire concernant la population de la capitale, fait dans la courant du Decembre 1869. Ainsi, il n'existait point de notices sur les épidémies dont St. Petersbourg etait en proie jusqu'à l'annee 1870,—si même on trouvait quelques renseignments sous ce rapport—etaient ils médiocres, et, en tout cas, n'insperaient aucune foi." *Du choléra à St. Petersbourg dans le conrant des années* 1870 *et* 1871. (A manuscript placed at my service by Dr. Fredk. J. Mouat.)

† *Transactions of the Imperial Medical Society of Caucasia.* M. Sobestiansky, writing of cholera, in 1872, at Nekhoshvy, district of Baku, observes:—"Although "the origin of the cholera has not been investigated, still we may say with certainty, "that it had a connexion with the epidemic which existed in the districts of Djevat "and Lenkoran, the more so as Nekhoshvy is situated on the route along which "pilgrims went in crowds to Persia and back."

information as it may possess regarding the sickness and mortality of the province. I have found it necessary in this report to supplement the information derived from Dr. Arkhangelsky's work relating to Caucasia with information derived from other sources, especially from the Transactions and Proceedings of the Imperial Medical Society of Caucasia. Of the supplemental information thus given, Dr. Kozlowky's account of the prevalence of cholera in the Fort of Hassav Yourt, district of Terek, in the autumn of 1867, may be especially noted (*see* p. 75). That the fact of so grave an outbreak should have, as is to be inferrred, found no place in the official records of the Imperial Government, indicates the insufficiency of those records, apart from special inquiry, for the discussion of the question I have raised. Indeed, if I read Dr. Sobestiansky aright in the article already referred to, there was cholera in Ciscaucasia in 1869.*

In view of these considerations, the remarkable fact that there is no record of transmission of cholera to Russian territory during the long-continued active prevalence of the disease in the provinces of Mazanderan and Astrabad, notwithstanding its wide diffusion in other directions, can hardly be received as proof that no such transmission took place without further investigation.

It is important that Dr. Pelikan's statement of the entire freedom from cholera of the tract of country intervening between Kiev and North Persia prior to the outbreak of the disease at Kiev in 1869, should not have attached to it the same significance as the expression would have if made of a country like England, where the complete registration of deaths, and large capabilities of obtaining knowledge as to prevalence of sickness, would give some show of justification for the interpretation of the term in its full sense. I say but a show of justification, for even here, with all these advantages, the search into the origin of outbreaks of cholera is one not unattended with difficulty. If the clue could so long escape detection in the outbreak of cholera at Southampton in 1866, how much the more readily might it escape at Kiev in 1869, when the question was complicated by the movements of a great pilgrimage? While undetermined possibilities exist of the carriage of cholera without detection over great distances, I maintain that, if cholera should break out in the interior of a country in free communication with another country in which the disease is active at the time, careful inquiry with respect to importation is needed, if an important source of error is to be avoided, notwithstanding that an extensive tract of country, believed to be free from the disease, may intervene between the new scene of outbreak and the affected country. The absence of such inquiry (in my opinion) vitiates the conclusion of Dr. Pelikan respecting the source of the outbreak at Kiev in 1869.

I have no purpose to discuss other than the data upon which the conclusions of Dr. Pelikan and Dr. Tholozan have been founded with relation to the particular outbreaks referred to. The magnitude of these conclusions appears to me to be altogether out of proportion to the precision of the data upon which they rest. I have already referred to the influence exercised upon the conclusions by the opinion formed respecting the origin of the epidemic of 1852–56 in Europe. It must be obvious that the argument I have urged here with reference to imperfect knowledge of movements of cholera in Caucasia, applies with even greater force to the period of that epidemic when a considerable portion of the province had not submitted to Russia. But the argument is of less force as applied

* He, writing of the diffusion of cholera in the Kuban district in 1872, observes that its general course was the same "as in the former years of cholera, 1866 and 1869.

to the origin of that epidemic than to the origin of the later epidemic. It is important, however, to bear in mind that, of the one recurring epidemic as of the other, the conclusions as to the source under consideration are founded upon defective data, and without reference to a probable concurrence of recrudescence and of the migration of newly invading cholera in the production of the phenomenon to be explained.

The same is true also of the conclusion as to the source of the outbreak at Meshed in 1868.

I can hardly exaggerate, however, the importance of these conclusions as questions of tentative epidemiology, especially as they have been handled by Dr. Tholozan, and I would refer to his lucid monographs: *Origine nouvelle du Choléra Asiatique, ou Début et Développement en Europe d'une Grande Épidémie Cholérique* (Paris, 1871); and *Durée du Choléra Asiatique en Europe et en Amérique, ou Persistance des Causes Productrices des Èpidémies Cholériques hors de l'Inde* (Paris, 1872). As less readily accessible, I add in an appendix a translation from the Russian of Dr. Arkhangelsky's account of the "Great Cholera Epidemic of 1852–55 in Russia" (See *Appendix*, Note A). From its bearing upon the same subject, I have added also a memorandum on the development of cholera in the basin of the Mississippi in 1873.

I have now brought this Report to a conclusion. In it I have endeavoured to trace from point to point that westward diffusion of cholera in the Eastern hemisphere, which, beginning in 1863, continued uninterruptedly to 1873. Wherever it has been possible to follow the diffusion in detail, its history has been that of a dissemination by human intercourse. Wherever the details of the diffusion have failed, I am unaware of any other suggestion which would explain the successive chronological phenomena. I have no concern in this Report with the conditions which here may have caused the dissemination to become fruitful, and there sterile. I have no concern, moreover, with the conditions which make the disease more diffusive at one period than at another. And in regard to the question of epidemic recrudescence of the malady in countries beyond India, I have limited myself to a discussion of the data bearing upon it derived from certain phenomena of the diffusion I have attempted to describe; adding some information relating to the question which it appeared to me, as being, perhaps, not easily accessible, might be usefully included in the Report. I have touched upon the etiology of cholera only so far as it is elucidated by the chronology of the diffusion and the initial condition of the successive appearances of the disease in different countries.

It is unlikely, having regard to the complexity and often imperfection of the information with which I have had to deal, as well as the difficulty of determining the just value of much of it, that I shall wholly have escaped error. But I venture to hope that the efforts I have made to avoid inaccuracy have not been unsuccessful in reference to the essential features of the Report, and that the facts stated are so recorded as to facilitate the correction of such errors as may be found in it, as other sources of information become available.

App. No. 1.

On Cholera, by Mr. J. Netten Radcliffe.

Tables.

Tables and Notes belonging to Mr. Netten Radcliffe's Report.

Table I.

England and Wales.

Deaths registered from Cholera, Diarrhœa, "Fever," and Zymotic Diseases generally (less Cholera), in England and Wales, during the 26 years, 1847–1872.

Year.	Population.	Cholera.	Diarrhœa.	"Fever."	Zymotic Diseases (less Cholera).
1847	17,150,018	788	11,595	30,094	100,548
1848	17,356,882	1,908	11,067	20,037	99,350
1849	17,564,656	53,273	17,831	18,339	87,851
1850	17,773,324	887	11,468	15,374	77,524
1851	17,982,849	1,132	14,728	17,930	89,000
1852	18,193,206	1,381	17,617	18,641	94,852
1853	18,404,368	4,419	14,192	18,554	85,145
1854	18,616,310	20,097	20,052	18,893	97,038
1855	18,829,000	837	12,770	16,470	87,546
1856	19,042,412	762	13,815	16,182	80,613
1857	19,256,516	1,150	21,189	19,016	92,484
1858	19,471,291	673	13,853	17,883	110,298
1859	19,686,701	887	18,331	15,877	105,758
1860	19,902,713	327	9,702	13,012	75,522
1861	20,119,314	837	18,746	15,440	87,149
1862	20,371,013	511	11,112	18,721	91,028
1863	20,625,855	807	14,943	18,017	118,924
1864	20,883,889	934	16,432	20,106	117,891
1865	21,145,151	1,291	23,531	23,034	112,657
1866	21,409,684	14,378	17,170	21,104	101,594
1867	21,677,525	922	19,851	16,862	90,067
1868	21,948,713	1,498	29,821	19,701	115,858
1869	22,223,299	702	19,903	18,389	109,899
1870	22,501,316	1,065	25,311	17,910	119,446
1871	22,782,812	866	24,140	15,790	122,164
1872	23,067,835	801	22,219	14,020	108,505
1873	23,356,414	749	21,795	13,553	88,537

Table II.*

Rumania.—Cholera, 1865.

Names of the Districts and Towns.	Duration of Disease.	Attacks.	Deaths.
	Old Style.		
Bakeu, district - -	18 August to 25 September -	57	42
„ town - -	24 „ „ 25 „ -	44	27
Byrlat, town - -	27 „ „ 26 October -	268	129
Tutova, district - -	27 „ „ 26 „ -	10	8
Bolgrad „ - -	2 „ „ 31 „ -	262	80
Brăila „ - -	4 „ „ 10 September -	978	344
„ town - -	19 July „ 10 „ -	1,812	783
Bukharest, town - -	5 October „ 31 December -	438	149
Buzeo, district - -	8 August „ 31 October -	178	85
Botosanĭ „ - -	23 November „ 31 December -	69	26
„ town - -	20 „ „ 31 „ -	575	169
Cahul, district - -	15 August „ 16 November -	40	26
„ town - -	1 September „ 2 October -	15	8
Călărasĭ, town - -	2 „ „ 30 „	85	40

* N.B.—As to dates of Tables relating to Rumania, see footnote, p. 51.

Names of the Districts and Towns.	Duration of Diseases.	Attacks.	Deaths.
	Old Style.		
Chilia, town - -	10 August to 27 October - -	123	55
Covurluiŭ, district -	2–7 August - - -	4	3
Doljiŭ „ - -	9–23 October - - -	11	6
Dorohoiŭ „ - -	1–31 December - - -	186	80
Focsanĭ, town - -	33 August to 13 September -	21	9
Galatz „ - -	24 July „ 28 October -	1,090	621
Giurgevo „ - -	27 August „ 2 September -	11	9
Ilfov, district - -	28 October „ 6 November -	54	22
Ismail, town - -	1 August „ 16 October -	381	172
Jalomitz, district - -	16 „ „ 1 November -	425	104
Jassy „ - -	10 November „ 31 December -	322	112
„ town - -	24 September „ 31 „ -	1,760	612
Muscel, district - -	12 November „ 16 November -	5	5
Ploescĭ, town - -	22-23 October - - -	7	5
Rimnicŭ-Sărat, district -	13 August to 24 October -	33	11
Rimnicŭ-Săratŭ, town -	13 „ „ 27 „ - -	137	16
Renĭ, town - -	29 July „ 15 September -	600	145
Vàlcov, town - -	1 September „ 4 October -	43	17
Vlasca, district - -	30 August „ 9 September -	13	10
		9,917 [? 10,057]	4,782 [? 3,930]

Table III.

Rumania.—Cholera, 1866.

Names of the Districts and Towns.	Duration of Epidemic.	Total.	
		Attacks.	Deaths.
	Old Style.		
Bakeu, district and town -	28 May to 15 September.	8,254	3,388
Bolgrad „ „ -	5 June „ 23 August.	1,114	332
Botosanĭ, district - -	1 March „ 31 „	874	364
Brăila „ - -	30 June „ 12 September.	507	196
„ town - - -	23 „ „ 13 August.	281	131
Civil Hospital, Braila, town -		75	34
Buzĕo, district - - -	30 „ „ 30 September.	6,156	1,618
Cahul, district and town -	26 „ „ 22 „	1,756	1,006
Covurluiŭ, district - -	26 „ „ 24 August.	2,767	1,068
Galatz, town - - -	23 „ „ 16 „	1,291	489
Dîmbovitza, district and town -	15 July „ 15 September.	57	66*
Dorohoiŭ „ „ -		166	46
Faltchei „ „ -	11 June „ 30 August.	120	1,915
Jalomitza „ „ -	9 July „ 30 September.	3,790	819
Jassy, district - - -	4 May „ 18 August.	2,981	1,403
Jassy, town, Hospital orfanilor	1 July „ 30 „	2,891	44
Galata, Hospital in - -	7 „ „ 24 July.	21	—
Golia, „ - -	1 „ „ 18 „	6	3
„ Cholera Hospital -	3 „ „ 30 „	21	10
Ilfov, district - - -	13 August „ 25 September.	294	66
Ismail „ - - -	10 June „ 8 August.	483	233
„ town - - -	10 „ „ 21 „	294	185
Némtu, district and town -	30 March „ 14 September.	1,354	772
San Spiridion hospital in Tîrgu-Némtu.	28 June „ 1 „	70	28

* So in original return.

Names of the Districts and Towns.	Duration of Epidemic.	Total. Attacks.	Total. Deaths.
	Old Style.		
Roman, district - -	5 June to 18 July.	2,006	1,362
„ town - - -	20 May „ 8 September.	1,131	463
„ Precista Hospital in town	5 June „ 18 July.	11	1
Prahova, district - -	4 July „ 26 September.	1,400	246
Ploescĭ, town - - -	2 „ „ 2 „	653	397
Sucéva, district and town -	18 March „ 30 „	1,016	502
Tecuciŭ „ „ -		7,428	3,126
Tutova, district - -	2 July „ 31 August.	2,869	1,764
Byrlat, town - - -	2 „ „ 31 „	777	337
Rîmnicu-Vâlcea, district & town	12 August „ 3 October.	376	135
Vasluiŭ, district and town -	14 June „ 13 September.	3,736	1,444
Giurgevo, town - -	4 „ „ 25 August.	177	43
Arges, district - - -	1 August „ 15 November.	263	151
Doljiŭ (penitenciarul Bucovĕt)	9 „ „ 30 September.	51	34
Rîmnicu-Săratu, district -	24 June „ 2 August.	6,355	4,396
„ town -		856	339
Caracal, town - - -	6 „ „ 10 October.	55	29
Teleorman, district - -	6 „ „ 28 August.	70	35
		64,541 [? 64,853]	26,174 [? 29,020]

Table IV.

Rumania.—Cholera, 1872.

District.	Number of Communes infected.	Duration of Disease.	Cholera. Cases.	Cholera. Deaths.
		Old Style.		
Bakeu - -	2	10 August to 12 August -	5	5
Faltchei - -	1	10 „ „ 12 „ -	4	4
Jassy - -	12	15 July „ 3 September	1,022	481
Roman - -	3	15 August „ 16 „	28	12
Vaslui - -	1	3 Sept. „ 9 „	34	22
		Totals -	1,093	524

Table V.

Rumania.—Cholera, 1873.

District.	Number of Communes infected.	Duration of Disease.	Cholera. Cases.	Cholera. Deaths.
		Old Style.		
Argesŭ - -	1	25 August to 15 September	4	3
Bakeu - -	1	19 July „ 20 July -	7	2
Braila - -	4	14 July „ 10 September	89	26
„ town -	—	24 June „ 7 „	656	327
Buseo - -	1	16 August „ 10 „	23	2
Cahul - -	2 & town	22 June „ 31 July -	86	34
Covurluiŭ - -	1	1 July „ 3 „ -	5	5
„ Galatz -	—	13 June „ 27 August -	372	240
Dmbovitza - -	2	20 August „ 21 „ -	11	4

District.	Number of Communes infected.	Duration of Disease.	Cholera. Cases.	Cholera. Deaths.
		Old Style.		
Doljiŭ - -	37	22 May to 20 September	4,922	899
„ Crajova -	—	1 June „ 22 August -	542	239
Faltchei - -	3	13 July „ 29 „ -	61	36
Gorgii - -	11	13 „ „ 14 „ -	367	63
Jalomitza - -	4	6 July „ 16 September	453	129
Ilfov - - -	5	18 „ „ 2 „	143	65
„ Bucharest -	—	13 August „ 15 December -	1,420	746
Ismail - -	2	7 July „ 21 August -	75	50
Mehedinti - -	20	17 May „ 31 „ -	682	278
„ Severin -	—	6 June „ 18 „	355	182
Nemtzu - -	10	6 July „ 16 September	244	61
Oltzu - -	1	13 August „ 2 „ -	40	7
Prahova - -	12	19 July „ 10 „ -	330	117
Rom-Sarat - -	1	9 „ „ 7 August -	24	5
Romanati - -	2	30 „ „ 18 September	95	45
Tecuciŭ - -	1	3 August „ 16 August -	11	7
Teliorman - -	7	8 July „ 16 September	311	104
Tutova - -	2	18 „ „ 31 July -	16	9
Vaslui - -	1	15 August „ 31 August -	6	3
Vlasca - -	7	17 „ „ 4 September	120	54
„ Guirgevo -	—	27 June „ 4 „ -	226	103
		Totals -	11,516 [? 11,696]	3,864 [? 3,845]

Table VI.*

European Russia.—Cholera, 1865.

Governments.	Beginning of the Epidemic.	Number of Persons attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Bessarabia - -	Oct. 1	148	37	0·03	Dec. 5.
Volhynia - -	Aug. 11	2,058	795	0·5	Up to 1 Jan. 1866 (cont.)
Voronej - - -	Nov. 13	51	15	0·01	Dec. 18.
Don Cossacks - -	Oct. 24	79	46	0·04	Jan. 8 (1866).
Ekaterinoslav-with-Taganrog.	„ 16	1,085	437	0·3	Feb. 15 „
Kiev - - -	Sept. 25	6,427	1,527	0·7	„ 17 „
Kursk - - -	Jan. 22 (1866.)	349	141	0·08	April 29 „
Podolia - - -	July 26	2,036	679	0·04	Jan. 21 „
Kharkov - - -	Nov. 15	331	186	0·1	April 21 „
Kherson (also Odessa and Nikolaiev.)	July 29	753	314	0·2	Jan. 31 „
Total - -	- -	13,315	4,177	—	
Province of Kertch-Yenikale (Taurida).	Aug. 17	82	41	—	Up to 27 Oct.

* N.B.—As to dates of Tables relating to Russia, see foot note, p. 51.

Table VII.

European Russia.—Cholera, 1866.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Archangel - -			None.		
Astrakhan - -	Aug. 3	429	225	0·4	Nov. 8.
Bessarabi - -	April 4	18,543	6,796	6·5	„ 30.
Vilna - - -	July 8	4,533	962	1·0	„ 24.
Vitebsk - - -	„ 13	3,453	1,255	1·5	„ 8.
Vladimir - -	Aug. 13	106	55	0·05	Oct. 11.
Vologda - - -	July 5	61	31	0·03	Aug. 13.
Volhynia - - -	Jan. 1	8,708	3,221	2·0	Dec. 31.
Voronej - - -	July 13	7,466	2,855	1·4	Nov. 30.
Viatka - - -	Aug. 17	6	1	0·004	Aug. 27.
Grodno - - -	June 11	11,213	3,161	3·3	Oct. 31.
Don Cossacks - -	July 14	3,273	1,305	1·3	Nov. —
Ekaterinoslav - with - Taganrog.	June 1	8,517	2,847	2·2	Nov. 30.
Kasan - - -	July 3	406	181	0·1	Oct. 16.
Kaluga - - -	„ 8	181	77	0·08	Nov. 17.
Kiev - - -	March 15	9,734	3,165	1·5	„ 30.
Kovno - - -	July 21	7,084	1,840	1·6	„ 10.
Kostroma - -	Aug. 1	12	3	0·003	Aug. 7.
Courland - -	July 23	1,029	513	0·9	Oct. 15.
Kursk - - -	June —	13,201	4,689	2·5	„ —
Livonia - - -	July 7	318	179	0·2	„ 12.
Minsk - - -	May 6	816	248	0·2	Jan. 31 (1867).
Mohilev - -	July —	984	363	0·4	Nov. —
Moscow - - -	June 16	2,198	1,011	0·6	„ 15.
Nijnigorod - -	July 22	1,067	481	0·4	Oct. 16.
Novgorod - -	June 24	1,377	486	0·4	„ 13.
Olonetz - - -	„ 29	649	335	1·1	Sept. 14.
Orenburg - -	Sept. 3	261	158	0·2	Nov. 13.
Orel - - -	June —	1,068	809	0·5	„ —
Pensa - - -	Aug. 9	785	307	0·3	Oct. 20.
Perm - - -	„ 14	378	108	0·05	„ 8.
Podolia - - -	May 30	28,220	10,513	5·4	Nov. 30.
Poltava - - -	June 1	15,462	5,370	2·7	Oct. 23.
Pskov - - -	July 13	1,083	465	0·6	Sept. 23.
Riazan - - -	Aug. 10	261	159	0·1	Oct. 26.
Samara - - -	„ 5	1,557	822	0·5	Nov. 27.
St. Petersburg - -	June 14	18,655	4,235	3·7	„ 30.
Saratov - - -	July 16	5,267	2,252	1·3	Oct. 31.
Simbirsk - - -	„ 24	1,736	718	0·6	„ 31.
Smolensk - -	Aug. 27	43	22	0·2	Nov. 2.
Taurida (with Kertch - Yenikale).	June 15	2,804	995	1·5	Oct. 27.
Tambov - -	July 8	1,712	751	0·4	Jan. 19 (1867).
Tver - - -	June 26	1,995	861	0·6	Sept. 27.
Tula - - -	July 19	383	149	0·1	Oct. 20.
Ufa* - - -	Sept. 11	80	46	0·04	„ 31.
Kharkov - -	June 23	3,484	1,315	0·8	„ 31.
Kherson (with Odessa) -	„ 14	13,948	5,066	3·4	„ 30.
Tchernigov - -	„ 25	3,201	871	0·6	„ 23.
Esthonia - - -	July 3	127	68	0·2	„ 25.
Jaroslav - - -	„ 1	79	41	0·04	Aug. 15.
Total - -	- -	208,858 [? 207,953.]	72,386	—	

* A government, with Ufa as capital town, constituted by the division of the former province of Orenburg.

Table VIII.

European Russia.—Cholera, 1867 and 1868.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Vilna	June 28	546	221	0·2	Oct. 17.
Vitebsk	May 8	65	5	0·006	May 12.
Volhynia	—	349	174	0·1	—
Grodno	Aug. 14	305	142	0·2	Sept. 23.
Kovno	,, 28	227	106	0·1	Nov. 9.
Kursk	,, 20	141	63	0·03	Sept. 12.
Minsk	June 1	4,076	1,360	1·2	Nov. 6.
Riazan	—	14	6	0·004	—
St. Petersburg (with the town of St. Petersburg).	Jan. 1	275	139	0·1	Dec. 31.
Kharkov	June 5	247	82	0·05	Sept. 3.
Total		6,245	2,298	—	
1868.					
Kiev	July 29	83	35	0·01	Aug. 15.

Table IX.

Poland.—Cholera, 1867.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Warsaw	April 9	10,688	3,671	4·0	Oct. 31.
Baletz	?	2,569	1,222	2·6	Dec. 20.
Lomjin	June 12	144	65	0·1	Sept. 22.
Lublin	April 9	4,283	2,130	3·3	Dec. 12.
Petrokov	Aug. 15	842	323	0·5	,, 15.
Plotzk	June 6	3,156	1,304	3·0	Sept. 30.
Radom	?	4,236	2,060	4·2	Oct. 31.
Siedlec	May 30	1,041	469	0·9	,, 31.
Souvalki	Nov. 16	59	21	0·04	Dec. 10.
Total		27,018	11,265	—	

Table X.

European Russia.—Cholera, 1869.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Kiev - - -	Aug. 8	338	162	0·8	Dec. 3.
Kaluga - - -	—	12	—	0·0	—
Kursk - - -	Nov. 27	4	2	0·001	Jan. 8 (1870).
Minsk - - -	Oct. 23	33	26	0·02	Dec. 26.
Moscow - - -	Dec. 25	261	122	0·07	Apr.27(1870).
Novgorod - -	—	58	25	0·02	—
Orel - - -	Nov. 3	502	293	0·2	Mar. 5(1870).
Poltava - - -	„ 12	4	3	0·002	Nov. 26.
St. Petersburg - -	—	35	11	0·009	—
Smolensk - -	Dec. 2	7	7	0·006	Jan. 2 (1870).
Tula - - -	Nov. 1	22	8	0·007	„ 1 (cont. toNov.1870).
Total - -	- -	1,276	659	—	

Table XI.

European Russia.—Cholera, 1870.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style				Old Style.
Astrakhan - -	Aug. 14	655	349	0·8	Oct. 23.
Vilna - - -	Nov. 1	53	27	0·03	Nov. 30.
Vladimir - -	Aug. 24	288	117	0·09	Dec. 14.
Varonej - - -	July 24	1,312	428	0·02	„ 15.
Viatka - - -	Aug. 31	19	11	0·005	Oct. 14.
Grodno - - -	Oct. 28	222	91	0·09	Nov. 30.
Don Cossacks - -	July 27	2,823	1,237	1·1	Oct. 7.
Ekaterinoslav - with - Taganrog.	June 1	4,404	1,324	1·0	Nov. 14.
Kasan - - -	Aug. 19	86	44	0·03	„ 26.
Kaluga - - -	„ 8	67	30	0·03	Sept. 12.
Kovno - - -	Nov. 30	20	7	0·006	Dec. 22.
Kostroma - -	Aug. ?	6	5	0·004	Aug. 29.
Kursk - - -	July 19	667	289	0·2	Dec. 25.
Moscow - - -	Aug. 25	196	101	0·05	Up to 1 Jan. (cont. in 1871).
Nijnigorod - -	„ 18	454	248	0·2	Sept. 15.
Novgorod - -	„ 28	7	3	0·003	Aug. 31.
Olonetz - - -	„ 24	2	2	0·007	Nov. 25.
Orenburg - -	Sept. 8	197	114	0·1	Dec. 16.
Orel - - -	July 1	3,244	2,050	1·3	Nov. 25.
Pensa - - -	Aug. 22	506	235	0·2	„ 30.
Perm - - -	„ 24	215	23	0·01	Sept. 30.
Samara - - -	„ 25	248	161	0·09	Oct. 31.
St. Petersburg - -	„ 16	1,785	772	0·6	Up to 1 Jan. (cont. in 1871).
Saratov - - -	July 29	1,738	810	0·5	Oct. 18.
Simbirsk - - -	„ 19	147	58	0·04	Sept. 30.
Taurida (with Kertch-Yenikale).	„ 7	1,062	394	0·6	„ 18.
Tambov - -	Sept. 13	145	75	0·03	Nov. 30.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Tula - - -	Cont. of the Ep. since Jan. 1.	490	168	0·1	Nov. 18.
Kharkov - - -	July 28	542	180	0·1	Dec. 29.
Kherson (with Odessa) -	„ 21	49	23	0·02	Oct. 9.
Jaroslav - -	Sept. 7	14	10	0·01	Nov. 30.
Total -	- -	21,663	9,386	—	

Table XII.

Poland.—Cholera, 1870.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Warsaw - - -	Oct. 2	308	122	0·1	Dec. —
Kalisz - - -	Nov. 2	51	20	0·03	„ 12.
Petrokov - -	„ 14	57	20	0·03	„ 7.
Plotzk - - -	„ 16	39	22	0·05	Jan. 15 (1871).
Rradom - - -	Oct. 11	69	34	0·06	Dec. 7.
Total - -	- -	524	218	—	

Table XIII.

European Russia.—Cholera, 1871.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Archangel - -	July 10	373	152	0·5	Nov. 10.
Astrakhan - -	„ 2	1,612	844	1·8	Oct. 9.
Bessarabia - -			Exempt.		
Vilna - - -	April 5	13,057	5,040	4·9	Dec. 31.
Vitebsk - - -	June 27	3,964	1,296	1·5	Sept. 15.
Vladimir - - -	„ 13	12,386	4,883	3·8	„ 23.
Vologda - - -	„ 23	3,023	1,076	1·1	„ 14.
Volhynia - -	July 25	2,110	692	0·4	Feb. 29 (1872).
Voronej - - -	June 21	28,605	11,007	5·0	Nov. 30.
Viatka - - -	„ 26	3,496	1,378	0·6	Oct. 31.
Grodno - - -	July 1	2,777	1,119	1·1	„ 31.
Don Cossacks.	„ 17	1,557	610	0·6	„ 30.
Ekaterinoslav - with - Taganrog).	„ 13	1,440	591	0·4	Sept. 19.
Kasan - - -	June 25	4,517	1,853	1·1	Oct. 31.
Kaluga - - -	„ 15	4,463	2,050	2·0	„ 20.
Kiev - - -	July 15	10,967	4,511	2·1	Up to 1 Jan.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Kovna - - -	July 1	1,307	500	0·4	Nov. 17.
Kostroma - -	June 22	5,600	2,021	1·7	Sept. 19.
Courland - -	July 4	485	249	0·4	„ 23.
Kursk - - -	„ 4	5,521	1,918	1·0	Dec. 31.
Livonia - - -	June 23	1,994	941	0·9	Nov. 13.
Minsk - - -	July 10	2,528	926	0·8	„ 14.
Mohilev - - -	„ 4	13,113	4,818	5·0	Jan. 31.
Moscow - - -	From the 1 Jan.	23,290	10,410	5·6	Nov. 15.
Nijnigorod - -	June 21	2,563	1,162	0·9	Sept. 15.
Novgorod - -	„ 9	2,776	1,075	1·0	„ 30.
Olonetz - - -	June 14	519	295	1·0	Oct. 20.
Orenburg - -	July 19	13,451	4,264	4·7	Jan. 10 (1872).
Orel - - -	„ 22	2,055	843	0·5	Sept. 30.
Pensa - - -	„ 2	9,527	2,687	2·3	Oct. 31.
Perm - - -	June 11	13,292	3,343	1·5	„ ?
Podolia - - -	Aug. 25	470	173	0·1	Dec. 25.
Poltavia - - -	July 5	1,769	639	0·3	Jan. 31 (1872).
Pskov - - -	March 13	809	246	0·3	Nov. 9.
Riazan - - -	„ 11	7,085	3,436	2·4	Oct. 10.
Samara - - -	June 27	11,724	5,001	2·9	„ 6.
St. Petersburg - -	From the 1 Jan.	7,158	3,017	2·3	„ 29.
Saratov - - -	June 25	15,981	6,261	3·6	„ ?
Simbirsk - - -	„ 22	2,264	643	0·5	„ 15.
Smolensk - -	July 1	11,290	4,296	3·8	„ 25.
Taurida - - -	Aug. 18	17	10	0·01	Aug. 31.
Tambov - -	April 5	34,033	14,477	6·7	Nov. 13.
Tver - - -	June 27	2,231	1,034	0·7	Sept. 13.
Tula - - -	„ 8	8,817	2,543	2·1	Nov. 15.
Ufa - - -	„ 25	6,805	2,128	1·6	Oct. 17.
Kherson - - -	„ 12	4,915	1,360	0·8	Nov. 14.
Kharkov - - -	Aug. 3	592	266	0·2	Jan. 27 (1872).
Tchernigov - -	July 29	1,052	423	0·3	Oct. 31.
Esthonia - - -	Oct. 1	231	136	0·4	Jan. 29 (1872).
Jaroslav - - -	June 5	13,100	6,238	6·2	Sept. 25.
Total - -	- -	322,711	124,831	—	

Table XIV.

Poland.—Cholera, 1871.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Souvalki - - -	March 18	4,214	1,418	2·7	Oct. 24.
Lomjinsk - -	Aug. 25	621	207	0·4	Nov. 21.
Kalisz - -	„ 26	51	22	0·03	Oct. 8.
Petrokov - -	Sept. 25	73	38	0·06	Nov. 17.
Total - -	- -	4,959	1,685	—	

Table XV.

Western Siberia.—Cholera, 1871.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Tobolsk - - -	July 31	286	83	0·07	Oct. 15.
Tomsk - - -	Aug. 23	573	216	0·3	Nov. 30.
Akmolinsk - -	„ 30	271	72	0·3	Oct. 16.
Total - -	- -	1,130	371	—	

Table XVI.

European Russia.—Cholera, 1872.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Archangel - -	None.				
Astrachan - -	Aug. 4	1,697	1,061	2·3	Nov. 15.
Bessarabia - -	May 1	13,286	4,773	4·3	„ 30.
Vilna - - -	Aug. 5	84	49	0·05	Dec. 15.
Vitebsk - - -	July 1	32	18	0·02	Sept. 20.
Vladimir - -	„ 15	66	27	0·02	Aug. 16.
Vologda - - -	None.				
Volhynia - -	May 18	26,842	11,163	6·4	Dec. 6.
Varonej - - -	„ 26	809	303	0·1	Oct. 15.
Viatka - - -	July 9	795	286	0·1	„ 22.
Grodno - - -	„ 9	5,984	2,379	2·2	Dec. 23.
Of the Don Cossacks -	„ 18	1,646	725	0·7	Nov. 30.
Ekaterinoslav-with-Taganrog	May 16	23,389	7,629	5·7	Oct. 14.
Kasan - - -	July 7	1,155	532	0·3	Nov. 22.
Kaluga - - -	June 21	429	137	0·1	Oct. 25.
Kiev - - -	From the 1 Jan.	53,300	19,843	9·0	Dec. 19.
Kovno - - -	July 28	1,905	809	0·7	„ 19.
Kostroma - -	„ 15	21	11	0·01	Sept. 11.
Courland - -	None.				
Kursk - - -	May 6	3,377	1,065	0·5	Oct. 20.
Livonia - - -	None.				
Minsk - - -	„ 15	7,781	3,039	2·6	Jan. 20 (1873).
Mohilev - - -	April 15	12,665	4,738	5·0	Oct. 31.
Moscow - - -	June 1	1,570	848	0·4	Dec. 31.
Nijnigorod - -	„ 28	461	274	0·2	Sept. 30.]
Novgorod - -	„ 21	570	173	0·2	Aug. 31.
Olonetz - - -	July 17	360	143	0·5	Nov. 18.
Orenburg (with the Oural District).	Sept. 18	279	182	0·2	Dec. 17.
Orel - - -	May 26	2,927	974	0·6	Sept. 30.
Pensa - - -	Aug. 6	249	101	0·1	Dec. 14.
Perm - - -	July 3	2,371	544	0·2	Oct. 31.
Podolia - - -	March 20	34,296	12,990	6·6	Nov. 30.
Poltava - - -	May 12	39,677	12,458	5·9	Oct. 15.
Pskov - - -	July 13	34	9	0·01	Sept. 24.
Riazan - - -	June 8	23	13	0·008	July 31.
Samara - - -	Aug. 8	669	371	0·2	Oct. 19.
St. Petersburg - -	June 11	4,871	2,364	1·8	Nov. 30.
Saratov - -	July 22	2,476	1,422	0·8	Oct. 11.
Simbirsk - - -	Aug. 10	470	171	0·1	Nov. 30
Smolensk - -	„ 28	72	24	0·02	Oct. 31.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Dea ths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Taurida (with Kertch-Yenikale).	May 24	4,523	1,769	2·5	Aug. 31.
Tambov - - -	Aug. 11	6	4	0·002	„ 14.
Tver - - -	July 5	595	268	0·2	Dec. 18.
Tula - - -	June 10	1,513	555	0·5	Sept. 19.
Ufa - - -	Sept. 12	16	5	0·004	„ 16.
Kharkov - -	May 23	9,686	2,631	1·5	„ 28.
Kherson (with Odessa) -	„ 15	17,913	5,960	4·2	Dec. 16.
Tchernigov - -	„ 8	29,122	10,084	6·0	Nov. 16.
Esthonia - - -	July 21	503	220	0·7	Sept. 17.
Jaroslav - - -	Aug. 23	92	52	0·05	„ 21.
Total - -	- -	310,607	113,196	—	

Table XVII.

Poland.—Cholera, 1872.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Warsaw - - -	Aug. 24	2,842	1,214	1·2	Up to 31 Jan. 1873 (cont.)
Lomjinsk - -	„ 22	3,547	1,770	3·4	Ditto (cont.)
Lublin - - -	Sept. 11	1,371	546	0·7	Dec. 31.
Petrokov - -	Oct. 16	570	238	0·3	Up to 28 Feb. 1873 (cont.)
Plotkz - - -	Sept. 17	2,192	872	1·6	Ditto (cont.)
Rodom - -	Oct. 18	97	25	0·05	Dec. 17.
Suvalki - -	Sept. 6	193	81	0·2	„ 20.
Siedlec - -	Oct. 2	4,937	851	1·5	Up to 31 Jan. 1873 (cont.)
Total - -	-	12,033 [15,749?]	5,280 [5,597?]	—	

Table XVIII.

Poland.—Cholera, 1873.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Warsaw - - -	May 18	12,795	5,788	5·8	Dec. 31.
Kalisz - -	Feb. 23	143	81	1·8	April 24.
	June 23	2,811	1,143		Dec. 15.
Keletz - - -	July 1	12,395	5,979	11·3	Nov. 30.
Lomjinsk - -	„ 3	1,201	550	1·1	„ 19.
Lublin - - -	„ 7	7,603	3,516	5·0	Dec. 31.
Petrokov - -	June 29	7,427	3,615	5·2	„ 31.
Plotkz - - -	July 2	3,142	1,098	2·3	„ 8.
Radom - - -	April 1	10,210	4,974	9·2	Nov. 30.
Suvalki - -	Sept. 6	48	26	0·5	Oct. 22.
Siedlec - - -	June 24	5,716	2,963	5·7	Nov. 24.
Total - -	- -	63,491	29,733	—	

Table XIX.

European Russia.—Cholera, 1873.

Governments.	Beginning of the Epidemic.	Number of Persons Attacked.	Deaths.	Proportion of Deaths to 1,000 Inhabitants.	End of the Epidemic.
	Old Style.				Old Style.
Bessarabia	June 20	53	2	0·002	June 23.
Vitebsk	July 20	200	66	0·07	Oct. 31.
Volhynia	June 12	2,424	1,056	0·6	„ 31.
Grodno	„ 7	4,071	1,809	1·8	Dec. 23.
Kiev	Aug. 1	15	10	0·005	Sep. 4.
Courland	Sept. 1	79	41	0·07	Oct. 31.
Livonia	Aug. 4	349	179	0·2	„ 31.
Minsk	June 25	966	399	0·3	Nov. 30.
Mohilev	Sept. 1	215	99	0·1	Dec. 31.
Novogorod	„ 6	126	70	0·07	Oct. 31.
Olonetz	Aug. 16	31	18	0·06	„ 20.
Orel	„ 1	23	11	0·007	Sept. 25.
St. Petersburg	June 20	1,283	626	0·5	Nov. 20.
Esthonia	Aug. 23	12	9	0·03	Sept. 18.
Total	-	9,847	4,395	—	

Table XX.

Italy.—Cholera, 1865, 1866, 1867.

(Exclusive of the former States of the Church, and, in 1865, of Venetia.)

Provinces.	1865.		1866.		1867.	
	Population of Communes attacked.	Deaths.	Population of Communes attacked.	Deaths.	Population of Communes attacked.	Deaths.
Abruzzo Citeriore	27,046	97	49,630	195	169,999	2,354
Abruzzo Ulteriore I.	33,386	3	39,600	9	51,108	427
Abruzzo Ulteriore II.	4,802	3	23,998	76	131,695	687
Alessandria	58,948	97	137,271	74	340,882	1,534
Ancona	201,390	3,138	88,348	7	142,732	76
Arezzo	—	—	—	—	39,508	4
Ascoli Piceno	44,875	15	—	—	48,029	69
Basilicata	36,814	132	4,762	118	242,309	2,464
Benevento	3,859	51	87,148	257	119,783	542
Bergamo	—	—	48,320	30	320,244	5,421
Bologna	109,395	19	109,395	81	162,451	124
Brescia	—	—	11,240	8	351,184	4,179
Cagliari	—	—	—	—	82,113	565
Calabria Citeriore	—	—	18,929	86	42,752	539
Calabria Ulteriore I.	—	—	—	—	63,914	1,359
Calabria Ulteriore II.		—	—	—	6,750	38
Caltanisetta	—	—	64,802	60	223,178	7,209
Capitanata	147,977	2,336	103,922	70	253,832	3,506
Catania	—	—	117,981	687	407,552	12,053
Como	445	3	8,597	12	239,804	2,682
Cremono	—	—	—	—	246,661	2,929
Cuneo	224,783	237	255,775	1,263	—	—
Ferrara	67,988	21	76,464	49	24,402	6
Firenze	126,637	2	5,059	2	152,121	16
Forli	91,050	53	77,643	4	—	—
Genova	14,198	6	363,950	1,522	395,444	1,573
Girgenti	—	—	45,499	98	262,962	12,516
Grossetto	—	—	—	—	5,460	2
Livorno	—	—	96,471	5	96,471	316

App. No. 1.

On Cholera, by Mr. J. Netten Radcliffe.

Tables.

Provinces.	1865.		1866.		1867.	
	Population of Communes attacked.	Deaths.	Population of Communes attacked.	Deaths.	Population of Communes attacked.	Deaths.
Lucca	—	—	17,344	1	177,221	78
Macerata	129,161	263	—	—	107,569	182
Mantova	—	—	—	—	37,981	12
Massa e Carrara	—	—	26,288	3	45,185	117
Messina	—	—	19,133	6	137,189	4,483
Milano	50,350	2	202,953	4	772,711	4,296
Modena	61,433	76	29,938	5	—	—
Molise	46,207	165	58,461	522	142,298	935
Napoli	781,413	3,379	826,274	5,393	783,644	1,959
Novara	34,782	3	46,676	21	266,697	2,325
Padova	—	—	—	—	157,099	226
Palermo	—	—	441,890	5,688	566,553	12,533
Parma	47,428	0	63,544	12	225,368	1,714
Pavia	—	—	35,284	8	332,856	2,314
Pesaro e Urbino	45,039	13	—	—	—	—
Piacenza	39,387	1	46,070	8	205,087	1,978
Pisa	—	—	51,057	1	137,838	53
Porto Maurizio	10,736	4	28,139	13	—	—
Principato Citeriore	97,736	30	258,981	749	240,444	1,137
Principato Ulteriore	—	—	84,536	133	176,800	1,476
Ravenna	57,303	2	—	—	74,856	28
Reggio nell' Emilia	58,351	14	14,092	4	86,270	67
Rovigo	—	—	—	—	54,251	62
Siracusa	—	—	—	—	135,960	2,353
Sondrio	—	—	—	—	30,806	71
Terra di Bari	341,030	1,636	159,655	77	549,829	9,291
Terra di Lavoro	228,901	161	357,953	864	382,651	1,494
Terra d' Otranto	80,591	645	115,742	247	366,402	5,226
Torino	246,648	223	284,449	361	495,062	6,049
Tranani	—	—	98,823	734	180,524	3,160
Treviso	—	—	—	—	48,482	11
Udine	—	—	—	—	3,170	1
Umbria	73,662	57	58,354	4	144,162	231
Venezia	—	—	—	—	211,009	543
Verona	—	—	—	—	133,870	172
Vicenza	—	—	—	—	50,932	8
Total	3,677,947	12,901	5,160,620	19,571	12,184,116	128,075
Divisions.						
Piemonte	565,161	560	724,171	1,719	1,102,641	9,908
Liguria	24,934	10	392,089	1,535	395,444	1,573
Lombardia	50,795	5	306,374	62	2,294,266	21,892
Veneto	—	—	—	—	696,794	1,035
Emilia	532,335	86	417,146	163	778,434	3,917
Umbria	73,662	57	58,354	4	144,162	231
Marche	420,465	3,429	88,348	7	298,330	327
Toscano	126,637	2	196,319	12	653,804	1,086
Abruzzi e Molise	111,441	268	171,689	802	495,100	4,403
Campania	1,166,105	3,635	1,614,992	7,396	1,703,322	6,608
Puglie	569,598	4,617	379,319	394	1,170,063	18,023
Basilicata	36,814	132	4,762	118	242,309	2,464
Calabria	—	—	18,929	86	113,416	1,936
Sicilia	—	—	788,128	7,273	1,913,918	54,107
Sardegna	—	—	—	—	82,113	565
Total	3,677,947 [?3,823 751]	12,901 [?12,887]	5,160,620	19,571	12,184,116	128,075 [?127,775]

Total population of Italy :—

1862 (Without Venetia) - - 21,776,953.

1866 (End of year, with Venetia) - - 24,149,766.

Table XXI.

Sweden.*—Cholera and Cholerine, 1866.

1	2	3	4	5	6
Districts.	Communes.	Attacks.	Deaths.	Attacks per 1,000 Population.	Deaths per cent.
Norrbotten - - -	8	116	48	1·54	41·3
Westerbotten - - -	4	34	19	0·37	55·9
Jemtland - - -	1	?	1	?	—
Wester-Norrland - -	12	590	151	4·55	25·6
Gefleborg - - -	10	693	307	4·77	44·3
Stora Kopparberg - -	3	35	2	0·19	5·7
Wermland - - -	26	1,058	484	4·03	45·7
Örebro - - - -	9	144	37	0·87	25·7
Westmanland - - -	8	119	53	1·07	44·5
Upsala - - - -	10	90	46	0·92	51·1
Stockholm - - -	9	86	46	0·66	53·5
Stockholm (city) - - -	1	2,105	655	15·23	31·1
Södermanland - - -	7	56	29	0·42	51·8
Göteborg and Bohus - -	23	3,811	1,359	16·32	35·7
Elfsborg - - - -	30	1,580	439	5·63	26·7
Skaraborg - - -	5	139	44	0·58	31·6
Östergötland - -	27	1,564	654	6·12	41·7
Calmar - - - -	6	185	45	0·79	24·3
Jönköping - - -	3	314	53	1·69	16·8
Kronoberg - - -	1	2	2	0·01	100·
Halland - - - -	3	9	4	0·07	44·4
Blekinge - - - -	2	10	1	0·07	10·
Christianstad - - -	2	5	4	0·02	80·
Malmöhus - -	3	36	10	0·11	27·7
Gottland - - -	3	18	10	0·35	55·5
Total - -	216	12,799	4,503	3·07	35·2

* Bidrag till Sveriges Officiel Statistik. Sundhets-Collegii Underdåniga Berättelse. 1866.

Table XXII.

England and Wales, 1866.

Deaths from Cholera and Diarrhœa in Registration Divisions.

Divisions.	Population, 1861.	Registration Districts.		Date of first Death from Cholera.	1866.	
		Number in which Deaths from Cholera occurred.	Number in which no Deaths from Cholera occurred.		Deaths from Cholera.	Deaths from Diarrhœa.
I. London -	2,803,989	36	—	26 June -	5,596	3,147
II. South-Eastern Counties.	1,847,661	57	38	13 June (Southampton).	865	956
III. South-Midland counties.	1,295,515	35	27	11 July (Chiswick).	111	699
IV. Eastern Counties.	1,142,562	27	29	12 July (West Ham).	501	519
V. South-Western Counties.	1,835,714	43	36	26 July (Totnes).	631	892
VI. West-Midland Counties.	2,436,568	42	37	23 April (Bristol).	139	2,007
VII. North-Midland Counties.	1,288,928	21	23	27 July (Gainsborough).	83	772
VIII. North-Western Counties.	2,935,540	33	2	1 May (Liverpool).	2,991	4,518
IX. Yorkshire -	2,015,541	33	20	4 July (Hull)	358	1,964
X. Northern Counties.	1,151,372	22	12	3 July (Sunderland).	610	1,135
XI. Monmouthshire and Wales.	1,312,834	34	14	-May (Llangafelach, Swansea).	2,493	561
England and Wales.	**20,066,224**	**383**	**238**	**23 April -**	**14,378**	**17,170**

Table XXIII.

England and Wales, 1866.

Deaths from Cholera and Diarrhœa in the several Counties.

Counties.	Population, 1861.	Deaths from Cholera.	Deaths from Diarrhœa.
I. London.			
Middlesex (part of) - - -	2,030,814	4,879	2,418
Surrey (part of - - -	579,748	377	569
Kent (part of) - - -	193,427	340	160
II. South-eastern Counties.			
Surrey (extra Metropolitan) -	273,264	82	133
Kent (extra Metropolitan) - -	545,272	284	290
Sussex - - - -	366,836	79	177
Hampshire - - - -	456,654	417	279
Berkshire - - - -	205,635	3	77

Counties.	Population, 1861.	Deaths from Cholera.	Deaths from Diarrhœa.
III. South-Midland Counties.			
Middlesex (extra Metropolitan) -	187,325	51	163
Hertfordshire - - -	177,452	9	83
Buckinghamshire - - -	147,207	10	48
Oxfordshire - - - -	171,233	4	64
Northamptonshire - - -	231,079	7	107
Huntingdonshire - - -	59,137	1	34
Bedfordshire - - - -	140,479	22	92
Cambridgeshire - - -	181,603	7	108
IV. Eastern Counties.			
Essex - - - -	379,705	471	200
Suffolk - - - -	335,409	15	156
Norfolk - - - -	427,448	15	163
V. South-western Counties.			
Wiltshire - - - -	236,027	11	67
Dorsetshire - - - -	182,193	6	44
Devonshire - - - -	589,278	525	375
Cornwall - - - -	364,848	21	146
Somersetshire - - -	463,368	68	260
VI. West-Midland Counties.			
Gloucestershire - - -	443,535	39	234
Herefordshire - - -	106,796	2	22
Shropshire - - - -	260,409	17	139
Staffordshire - - -	769,541	30	890
Worcestershire - - -	294,953	36	215
Warwickshire - - -	561,334	15	507
VII. North-Midland Counties.			
Leicestershire - - -	243,648	3	209
Rutlandshire - - -	23,479	—	12
Lincolnshire - - -	404,143	48	151
Nottinghamshire - - -	323,784	12	230
Derbyshire - - - -	293,874	20	170
VIII. North-western Counties.			
Cheshire - - - -	470,174	391	402
Lancashire - - - -	2,465,366	2,600	4,116
IX. Yorkshire.			
West Riding - - -	1,530,007	283	1,615
East Riding (with York) - -	274,425	54	234
North Riding - - -	211,109	21	115
X. Northern Counties.			
Durham - - - -	542,125	353	620
Northumberland - - -	343,025	224	355
Cumberland - - - -	205,276	32	146
Westmoreland - - -	60,946	1	14
XI. Monmouthshire and Wales.			
Monmouthshire - - -	196,977	204	96
South Wales - - -	699,722	2,033	352
North Wales - - -	416,135	256	113

Table XXIV.

Scotland, 1866.

Deaths from Cholera and Diarrhœa in the several Counties.

Counties.	Population, 1861.	Deaths from Cholera.	Deaths from Diarrhœa.
I. Northern.			
Shetland	31,670	1	3
Orkney	32,395	1	2
Caithness	42,200	—	2
Sutherland	24,157	—	6
II. North-western.			
Ross and Cromarty	82,427	1	15
Inverness	84,902	—	28
III. North-eastern.			
Nairn	8,347	1	3
Elgin	44,218	—	16
Banff	56,020	1	12
Aberdeen	223,344	142	107
Kincardine	34,854	22	15
IV. East-Midland.			
Forfar	206,750	214	125
Perth	133,198	24	45
Fife	155,021	260	60
Kinross	8,731	—	1
Clackmannan	20,122	3	7
V. West-Midland.			
Stirling	88,138	6	49
Dumbarton	54,179	7	20
Argyle	83,859	44	29
Bute	16,331	2	5
VI. South-western.			
Renfrew	168,746	39	106
Ayr	199,063	36	107
Lanark	640,444	11	449
VII. South-eastern.			
Linlithgow	39,045	15	19
Edinburgh	274,093	333	181
Haddington	37,626	24	21
Berwick	36,488	3	13
Peebles	11,300	1	—
Selkirk	10,410	2	8
VIII. Southern.			
Roxburgh	53,722	3	11
Dumfries	75,904	1	23
Kirkcudbright	42,495	1	7
Wigtown	42,095	2	9
Scotland		1,170	1,504

Table XXV.

Ireland, 1866.

Deaths from Cholera and Diarrhœa in the several Counties.

Counties.	Population, 1861.	Deaths from Cholera.	Deaths from Diarrhœa.
Province of Leinster.			
Carlow	51,802	82	18
Dublin	412,032	1,459	369
Kildare	100,388	106	31
Kilkenny	113,065	3	56
King's	95,821	8	28
Longford	90,889	24	20
Louth	111,955	17	39
Meath	83,497	2	13
Queen's	74,088	8	28
Westmeath	56,264	19	16
Wexford	155,611	118	38
Wicklow	84,617	131	37
Province of Munster.			
Clare	155,575	10	45
Cork	557,325	175	168
Kerry	197,086	8	46
Limerick	220,896	155	93
Tipperary	246,948	14	97
Waterford	151,047	13	48
Province of Ulster.			
Antrim	355,201	48	189
Armagh	229,051	8	74
Cavan	171,167	3	17
Donegal	225,022	3	43
Down	272,811	16	126
Fermanagh	98,275	1	13
Londonderry	194,713	3	41
Monaghan	136,539	10	39
Tyrone	248,142	3	44
Province of Connaught.			
Galway	273,939	10	57
Leitrim	95,311	2	6
Mayo	252,558	28	29
Roscommon	186,763	8	14
Sligo	100,166	6	29
Ireland	—	2,501	1,911

Table XXVI.—Egypt, 1865.—État Général des décès Cholériques, en Égypte, pendant l'Épidémie de 1865.*

Villes et Provinces.	Décès. Classifiés par Sexes. Hommes ou Garçons.	Femmes et Filles.	Total.	Classifiés par Croyances. Musulmans.	Chrétiens.	Israélites.	Total.	Commencement de l'Épidémie.	Fin de l'Épidémie.	Durée de l'Épidémie.	Chiffre approximatif de la Population.	Observations Générales.
Alexandrie -	2,263	1,755	4,018	3,299	678	41	4,018	11 Juin -	19 Aout -	69 jours -	180,796	4,018 décès sur une population de 180,796, donnent 22 1/4 0/00.
Caire -	3,400	2,704	6,104	5,487	548	69	6,104	17 „ -	17 Sept. -	92 „ -	282,348	6,104 décès sur une population de 282,348, donnent 21 3/4 0/00.
Ramhlet -	43	40	83	70	13	—	83					
Agiami -	16	2	18	18	—	—	18					
Aboukir -	13	10	23	23	—	—	23					
Rosette -	1,069	1,099	2,168	2,166	2	—	2,168	19 „ -	28 Juillet	39 „ -	21,130	2,168 décès sur une population de 21,130, donnent 107 3/4 0/00.
Damiette -	1,128	1,246	2,374	2,307	67	—	2,374	26 „ -	14 Août -	49 „ -	57,000	2,374 décès sur une population de 57,000, donnent 41 2/3 0/00.
Port-Said -	50	10	60	6	54	—	60	28 „ -	3 Juillet	34 „ -		
El-Arich -	19	16	35	34	1	—	35	5 Juillet	26 Sept. -	83 „ -		
Suez - -	48	9	57	18	39	—	57	26 Juin -	7 Août -	42 „ -		
Prov. de Béhéra	1,204	1,037	2,242	2,240	2	—	2,242	20 „ -	19 Sept. -	91 „ -		
Garbié -	5,805	4,376	10,181	10,064	117	—	10,181	20 „ -	12 „ -	83 „ -		
Menoufié -	1,444	1,204	2,648	2,644	4	—	2,648	29 „ -	12 „ -	74 „ -		
Dakalié -	3,858	3,498	7,356	7,272	84	—	7,356	22 „ -	3 Août -	42 „ -		
Charkié -	1,903	1,688	3,591	3,479	112	—	3,591	21 „ -	16 „ -	56 „ -		
Galioubié -	392	307	699	699	—	—	699	25 „ -	5 Sept. -	72 „ -		
Ghizi - -	810	663	1,473	1,473	—	—	1,473					
Benisouelf -	513	518	1,031	1,031	—	—	1,031	2 Juillet				
Fayoum -	718	588	1,306	1,306	—	—	1,306					
Minié -	946	820	1,509	1,766	257	—	1,766	30 Juin -	2 Sept. -	63 „ -		
Assiout -	2,293	2,094	4,387	4,387	—	—	4,387					
Ghirgé -	2,930	2,845	5,775	5,775	—	—	5,775					
Kéné -	1,581	1,503	3,084	3,084	—	—	3,084	23 Juillet				
Cosseir et Esné	408	305	713	713	—	—	713					
	32,854	28,337	60,935	59,361	1,978	110	61,192					

* Réponses à Douze Questions sur le Choléra de 1865 et Egypte. Par M. Colucci Bey, Président de l'Intendance Générale Sanitaire d'Egypte.—Alexandrie, 1866.

Table XXVII.

Prussia.—Cholera, 1866.

Governments and Provinces.	Civil Population of infected Districts, 3 Dec. 1864.	Cholera. Attacks.	Cholera. Deaths.	Duration of Prevalence.	Per 1,000 Inhabitants. Attacks.	Per 1,000 Inhabitants. Deaths.	Per centage of Deaths to Attacks.	Annual Rate of Mortality per 1,000 Inhabitants.
Government of Königsberg	1,024,591	17,290	9,054	22 June—Dec. (begin. of)	16·8	8·8	52	—
„ Gumbinnen	724,252	3,284	1,900	14 July—21 Dec.	4·5	2·6	58	5·9
„ Danzig	489,658	5,251	3,030	8 July—11 Nov.	10·7	6·2	58	17·8
„ Marienwerder	743,714	10,775	5,177	6 June—27 Nov.	14·5	7·0	48	14·6
Province of Prussia	2,982,215	36,600	19,161	6 June—21 Dec.	12·3	6·4	52	11·7
Government of Posen	965,684	25,239	11,855	15 June—30 Nov.	26·1	12·3	47	26·6
„ Bromberg	540,260	16,784	8,306	30 June—30 Nov.	31·1	15·4	49	36·5
Province of Posen	1,505,944	42,023	20,161	15 June—30 Nov.	27·9	13·4	48	28·9
City of Berlin	609,733	8,186	5,457	14 June—17 Nov.	13·4	8·9	66	20·7
Government of Potsdam	955,320	11,350	5,824	June—3 Dec.	11·9	6·1	51	12·3
„ Frankfurt-on-the-Oder	911,095	12,601	6,668	2 June—22 Nov.	13·8	7·7	53	15·3
Province of Brandenburg	2,476,148	32,137	17,949	2 June—3 Dec.	13·0	7·2	56	14·2
Government of Stettin	665,994	19,503	10,126	29 May—30 Dec.	29·3	15·2	52	25·7
„ Köslin	539,586	3,982	2,328	3 June—5 Dec.	7·4	4·3	58	9·9
„ Stralsund	213,141	3,231	1,648	16 June— Dec.	15·1	7·7	51	12·4
Province of Pomerania	1,418,721	26,716	14,102	29 May—30 Dec.	18·8	9·9	53	16·7
Government of Breslau	1,327,708	23,160	14,391	25 June—31 Dec.	17·4	10·8	62	20·7
„ Oppeln	1,182,381	9,938	3,659	1 July—21 Dec.	8·4	3·1	37	6·5
„ Liegnitz	963,170	4,525	2,707	4 July—21 Dec.	4·7	2·8	60	6·0
Province of Silesia	3,473,259	37,623	20,757	25 June—31 Dec.	10·8	6·0	55	11·0
Government of Magdeburg	735,051	10,715	4,951	9 July—30 Nov.	14·6	6·7	46	16·9
„ Merseburg	847,082	14,364	6,982	2 July—1867	16·9	8·2	49	16·4
„ Erfurt	366,476	2,470	1,462	23 July—14 Nov.	6·7	4·0	59	12·7
Province of Saxony	1,948,609	27,549	13,395	2 July—1867	14·1	6·9	49	13·8
Government of Münster	346,051	168	88	22 July—14 Dec.	0·5	0·3	52	0·7
„ Minden	395,897	1,191	377	11 July—20 Oct.	3·1	0·9	32	3·4
„ Arnsberg	632,749	3,715	1,970	28 June—14 Jan. 1867	5·8	3·1	53	5·6
Province of Westphalia	1,374,697	5,074	2,435	28 June—14 Jan., 1867	3·7	1·8	48	3·3
Government of Cologne	464,503	712	386	16 July—Dec. (end of)	1·5	0·8	54	1·7
„ Düsseldorf	1,207,837	5,522	2,452	10 June—15 Feb. 1867	5·5	2·5	44	3·6
„ Coblenz	451,328	3,790	1,167	3 April—23 Nov.	8·4	2·6	31	4·0
„ Treves	514,634	4,831	1,697	2 Feb.—13 Jan. 1867	9·3	3·3	35	3·5
„ Aachen	395,726	1,805	1,021	26 July—13 Dec.	4·6	2·6	57	6·7
Province of the Rhine	2,834,028	16,660	6,723	2 Feb., 1866—16 Feb. 1867	5·9	2·4	40	2·3
Hohenzollern and Jahde	Free from cholera.							
Totals	18,013,621	224,382	114,683	2 Feb. 1866—16 Feb. 1867	12·5	6·4	51	6·1

Table XXVIII.

Prussia.—Cholera, 1867.

(N.B.—The returns for Königsberg, Gumbinnen, Posen, Berlin, Magdeburg, Minden, and Kiel had not been published at the time of compilation of this Table, and are not included in it.)

Governments and Provinces.	Civil Population of infected Districts, 3 Dec. 1867.	Cholera.		Duration of Prevalence.	Per 1,000 Inhabitants		Per-centage of Deaths to Attacks.	Annual Rate of Mortality per 1,000 Inhabitants.
		Attacks.	Deaths.		Attacks.	Deaths.		
Government of Königsberg	No return							
„ Gumbinnen	Ditto.							
„ Danzig	463,972	1,098	666	24 June—30 Nov.	2·37	1·44	60·6	3·28
„ Marienwerder	362,351	453	244	14 June—15 Nov.	1·25	0·67	54·0	1·61
Province of Prussia	826,323	1,551	910	14 June—30 Nov.	1·88	1·10	58·7	2·51
Government of Posen	No return							
„ Bromberg	138,927	124	53	14 July—15 Oct.	0·89	0·38	42·7	1·21
Province of Posen	138,927	124	53	14 July—15 Oct.	0·89	0·38	42·7	1·21
City of Berlin	No return							
Government of Potsdam	374,772	15	7	9 July—15 Oct.	0·04	0·02	46·7	0·07
„ Frankfurt-on-the-Oder.	—	—	—	—	—	—	—	—
Province of Brandenburg	374,772	15	7	9 July—15 Oct.	0·04	0·02	46·7	0·07
Government of Stettin	37,556	1	1	25 July—25 July	0·03	0·03	100·0	10·95
„ Köslin	—	—	—	—	—	—	—	—
„ Stralsund	—	—	—	—	—	—	—	—
Province of Pomerania	37,556	1	1	25 July—25 July	0·03	0·03	100·0	10·95
Government of Breslau	740,826	1,151	729	26 July—8 Nov.	1·37	0·98	63·3	3·37
„ Oppeln	843,610	902	381	6 April—28 June	1·07	0·45	42·2	1·95
„ Liegnitz	—	—	—	—	—	—	—	—
Province of Silesia	1,584,436	2,053	1,110	6 April—8 Nov.	1·30	0·70	54·1	1·18
Government of Magdeburg	No return							
„ Merseburg	396,317	422	103	6 Sept.—16 Nov.	1·06	0·26	24·4	1·32
„ Erfurt	—	—	—	—	—	—	—	—
Province of Saxony	396,317	422	103	6 Sept.—16 Nov.	1·06	0·26	24·4	1·32
Government of Münster	79,874	3	2	28 Sept.—1 Oct.	0·04	0·03	66·7	2·74
„ Minden	No return							
„ Arnsberg	557,630	327	193	12 Aug.—28 Dec.	0·53	0·35	59·0	0·92
Province of Westphalia	637,504	330	195	12 Aug.—28 Dec.	0·52	0·31	59·1	0·81
Government of Cologne	315,643	1,429	678	2 June—1 Nov.	4·53	2·15	47·4	5·16
„ Dusseldorf	917,875	5,087	2,636	1 Jan.—24 Nov.	5·54	2·87	51·8	3·20
„ Coblenz	197,320	17	12	21 March—30 April	0·09	0·06	70·6	0·11
„ Treves	63,141	11	7	29 March—16 April	0·17	0·11	63·3	2·11
„ Aachen	63,384	133	85	15 Sept.—20 Dec.	2·10	1·34	63·9	5·04
Province of the Rhine	1,557,363	6,677	3,418	1 Jan.—20 Dec.	4·29	2·19	51·2	2·26
Province of Hohenzollern	—	—	—	—	—	—	—	—
Jahde	—	—	—	—	—	—	—	—
Government of Kiel	No return							
„ Schleswig	59,546	4	4	28 Aug.—6 Sept.	0·07	0·07	100·0	2·56
Province of Schleswig-Holstein.	59,546	4	4	28 Aug.—6 Sept.	0·07	0·07	100·0	2·56

Governments and Provinces.	Civil Population of Infected Districts, 3 Dec. 1867.	Cholera. Attacks.	Cholera. Deaths.	Duration of Prevalence.	Per 1,000 Inhabitants. Attacks.	Per 1,000 Inhabitants. Deaths.	Per-centage of Deaths to Attacks.	Annual Rate of Mortality per 1,000 Inhabitants.
Government of Hanover	—	—	—	—	—	—	—	—
„ Hildesheim	59,260	308	217	27 Aug.—21 Oct.	5·20	3·66	70·5	23·86
„ Luneburg	—	—	—	—	—	—	—	—
„ Stade	—	—	—	—	—	—	—	—
„ Osnabruck	—	—	—	—	—	—	—	—
„ Aurich	—	—	—	—	—	—	—	—
Province of Hanover	59,260	308	217	27 Aug.—21 Oct.	5·20	3·66	70·5	23·86
Government of Cassel	24,426	8	4	17 May—25 May	0·33	0·16	50·0	6·49
„ Wiesbaden	125,332	12	9	10 Sept.—8 Dec.	0·10	0·07	75·0	0·28
Province of Hesse-Nassau	149,758	20	13	17 May—8 Dec.	0·13	0·09	65·0	0·16
Province of Lauenburg	—	—	—	—	—	—	—	—
Totals	5,821,762	11,505	6,031	1 Jan.—28 Dec.	1·98	1·04	52·4	1·05

Note A.

Dr. Arkhangelsky's Account of the Great Cholera Epidemic of 1852–55 in Russia.

(Translated from a reprint of a paper published in the Russian "*Archives of Legal and General Hygienics*, No. 4," December 1871.)

Russia, 1852–55, Dr. Arkhangelsky.

In the two succeeding years 1850–51, following the great cholera epidemic of 1846–49, which had passed into Europe from India through Persia, cholera was met with on the Continent of Europe only as a limited local epidemic, especially in 1851, when the number of places smitten with it was very insignificant, and when the virulence of the epidemic was reduced almost, one might say, to a minimum. From 1852 a fresh series of the most violent cholera epidemics began, which overspread the whole of Europe, and in some places were peculiarly severe.

The question whence arose this third great epidemic in Europe, whether from the remains of the past epidemic or in consequence of a fresh advancing movement of cholera from the place of its birth, India, remains up to this day undecided. This question has an exceedingly great practical importance. The self-origin of Asiatic specific cholera in Europe is denied by all the known facts of the spread of cholera epidemic, and is rejected by the experience of modern medical science. The Constantinople International Sanitary Conference acknowledged as a fact that encroaching Asiatic cholera ("*envahissant*") has never spontaneously developed itself, and has never been met with as an endemic—which must not be confounded with more or less obstinate secondary cholera nests—in any of the undermentioned places, namely, Europe, the Caucasian Provinces, Asiatic Turkey, the whole of the north of Africa, and America, but that it was always brought there from abroad. On these grounds the final solution of the question of the origin of the great cholera epidemic of 1852–55 has great interest with regard to the etiology of cholera. The opinions of epidemiologists respecting this question vary. Some, as, for instance, Professors Griesinger and Lebert, admit a close relation between the epidemics of 1846–49 and those of 1852–55, and acknowledge them to have been but two periods of one and the same epidemic, begun in 1846 in Europe; others, as, for instance, Professors Hirsch and Gezer, explain the epidemic of 1852–55 as a fresh spread from India through Persia into Russia. The former base their opinion on this universally admitted fact that Europe in 1850 and 1851 was not free from cholera; the latter, on this, that from 1849 cholera again increased in India, assumed there a progressive movement, and in 1852

Russia, 1852-55, Dr. Arkhangelsky.

existed in Persia, the Transcaucasus, Russia, and Poland, whence it passed into Prussia.

Professor Gezer, in his "History of Epidemic Diseases," says "that the out-"break of cholera from 1852 to 1856 in all those places where it existed was "exceedingly severe. In India, where this epidemic broke out afresh in 1849, "cholera was in 1852 particularly virulent. In February and March it "appeared in Bombay, in August in Oudh, afterwards in Sumatra and Java. "At one and the same time, by the former route through Persia, Bassora, and "Bagdad, along the coasts of the Caspian Sea, Transcaucasus, and Kur-"distan, it advanced towards the west. Afterwards it spread very quickly "through Russia, Poland, and the greater part of the eastern provinces of "Prussia." (See Gezer, *History of Epidemic Diseases*, St. Petersburgh, 1867, Part 2, p. 169.) Professor Hirsch, in his "Manual of Historico-Geographical Pathology," was evidently the first who said that cholera in the beginning of 1852 was already found on the coasts of the Caspian Sea, whence by various routes it entered Russia and Poland, and by the end of the summer of the same year it reached the eastern provinces of Prussia, Silesia, and Pomerania. (See *Historische Geographische Pathologie.* Erlangen, 1860, vol. iv., p. 125.) This opinion was accepted without critical investigation. Professor Lebert, in spite of his acknowledging the two great epidemics of 1846–49 and of 1852–55 as two periods of one and the same epidemic, says as follows:—"The "cholera in 1850 was exceedingly severe in the greater part of Persia, and in "1851–52 peculiarly so on the southern slope of the Caucasus. The new epi-"demic again passed through Russia, Poland, Prussia, and Scandinavia; "afterwards it visited England, France, the entire coast of the Mediterranean "Sea, Italy, Switzerland, Southern Germany, &c." (See Lebert, *Manual of Practical Medicine;* St. Petersburgh, 1861, Part I., pp. 386–87.)

Doctor Tholozan, physician to the Shah of Persia, in his pamphlet, "Origine "nouvelle du choléra Asiatique, ou début et développement en Europe d'une "grande épidemie cholérique, Paris, 1871," refutes the opinion of Professor Hirsch and shows that in 1852 the cholera could not pass from Persia into Poland through Russia, because, in such a case, its progress must have been peculiarly rapid, and the places which would have been smitten on its advance must have been known to epidemiologists. As the most conclusive proof of the fallacy of the opinion of Dr. Hirsch, Dr. Tholozan states that the delegates of the Russian Government at the Constantinople International Sanitary Conference, Dr. E. V. Pelikan, Director of the Medical Department of the Ministry of the Interior, Drs. Lentz and Bykov, admitted the spread of cholera from Persia into Russia only in the three epidemics of 1823, 1830, and 1847; and had the cholera of 1852 reached Russia from Persia they would have acknowledged it at the Conference. Setting aside the opinion of Dr. Hirsch, Dr. Tholozan endeavours to prove that this epidemic arose in the kingdom of Poland, and, consequently, is of European origin; but such a conclusion will not bear investigation. Is it, for instance, possible to talk of the European origin of potatoes, when it is historically known that they were originally introduced from America, and that they do not exist in an uncultivated state in Europe? Should the cultivation of potatoes under certain circumstances be prohibited, they would soon disappear from the continent of Europe, and for their fresh cultivation in Europe it would be necessary to introduce them afresh either from America or from other places where their cultivation had been continued, or it would have been necessary to find out a place in Europe in which, in spite of this general prohibition, they might have been secretly cultivated. This new spread of potatoes throughout the whole of Europe from such a place which had preserved the remnant of their cultivation, would it have given the right to assert that potatoes are of European origin? Evidently not. On the same principle it is impossible to talk of the European origin of Indian cholera. Facts proving that out of the modified remnants of cholera epidemics, new and more or less malignant local epidemics may arise under favourable but not yet decided conditions, are already well known; but the fact that the insignificant remnants of an epidemic should be the radiating centre of epidemics, not yielding in extent and malignity to the pandemics spreading directly from India, is not fully recognized by modern science, and does not enjoy popularity among epidemiologists. Hence the questions which the Constantinople International Sanitary Conference had to discuss were as follows:—"To investigate the original causes of cholera, to learn its character

" and its progress, and to ascertain the chief points whence it emanates; and, " finally, to propose practical means for restricting its progress and eradicating " it from its original birthplace." It is necessary to remark that the Conference began its sittings at the commencement of 1866, when cholera had already passed into Europe and continued to exist in many places, that is, when the question of its passage had already lost for that time its practical importance. Notwithstanding this, the delegate of the French Government, Dr. Fauvel, at the first meeting of the Conference, held February $\frac{1}{13}$, raised a very important question on the possibility of cholera spreading from Mecca to Egypt, and proposed measures demanding instant application ("mésures d'urgence"). Dr. E. V. Pelikan, with reference to the work which would be necessary in order to examine the practical bearings of this proposal, submitted whether it would not be better to discuss the measures proposed by the French delegates at the general meetings of the Conference without giving them any special urgency as regards the spring of 1866. This opinion Dr. Pelikan supported by the following remarks:—

1. It is known from the history of all cholera epidemics that this disease had never made its appearance (from India into Europe) by one and the same route in two successive years; but that, on the other hand, having once reached us, in spite of occasional lapses, it afterwards, without any fresh importation from Asia, broke out with its original malignity in various parts of Europe; and,

2. That our present knowledge of the transmissibility ("transmissibilité") of cholera is in an unsatisfactory state, especially as there are many circumstances entirely unknown to us on which the spread of cholera depends.

For these reasons Dr. Pelikan was of opinion that no scientific gain would accrue from adopting urgent measures ("mésures d'urgence") against the new spread of cholera from Mecca to us, and that the only reason for adopting these measures would be that of self-preservation. It would be better, continued Dr. Pelikan, to discover measures against the spread of the remnants of the cholera of last year, when the proper time arrived for discussing the question. (Proceedings of the International Sanitary Conference at Constantinople. *Archives of Legal and Medical Hygienics*, 1866, No. 3.)

This opinion of Dr. Pelikan, having a most important practical value with reference to the European countries, did not receive full sympathy from the members of the Conference. Meanwhile, there were six sittings of the Conference on the question raised by the French delegates.

The spread of cholera of 1852–55 shows in a most marked manner the importance of the question raised by Dr. Pelikan at the Constantinople Conference for European States. Its further spread in 1866 affords additional proof. The Constantinople Conference admitted "that one person infected with cholera " may be the cause of the spread of the disease." "That the spread of the " epidemic depends more or less upon the favourable or unfavourable con- " ditions of the locality where it exists, in the same way that the extent of the " fire is not proportionate to the spark which originated it, but depends upon " the combustible nature or inflammability of the object attacked. The " stoppage of an epidemic does not depend upon the disease becoming less " violent, but upon its total eradication, or the place where it existed " becoming unable to propagate it." (*Archives of Legal and Medical Hygenics*, 1867, No. 1.)

We will now proceed to investigate the spread of the great cholera epidemic of 1852–55.

After the great epidemic of 1847–49 the cholera of 1850 appeared considerably weaker. In the course of this year it existed in Europe in the following countries: Germany, Austria, Denmark, Sweden and Norway, as an epidemic; in France, especially in the town of Marseilles, in the form of separate cases of attack; also in Russia it appeared in isolated cases in the government of Podolsk, and from the 12th to the 22nd of October, in the town of Kamenetz and its district. The total number of persons smitten with cholera at Kamenetz and its neighbourhood was 38, out of which 14 died; besides the above, separate cholera cases were discovered in the government of Vilna, in the district of Zaslav. The other parts of Europe were free from cholera. In the winter of 1850–51 cholera ceased everywhere, with the exception of Bohemia, in Austria, where it continued through the winter in a comparatively slight degree, but in the summer it spread violently again,

and from the official reports it appears that the number of persons attacked with cholera in 1851 was 53,122. Out of this number 23,225 died. At Prague it appeared together with measles, scarlet fever, small-pox, and typhus fever. At Troppau, in Austria, and Silesia, it was exceedingly severe. In the town of Brunn, in Moravia, there were only a few separate cases of this disease.

At the time when the epidemic in 1851 was at it highest point in Bohemia, the first cases of the disease appeared in the districts Habelschwert and Glatz, lying close to the Bohemian-Moravian frontier. In the district of Rybnik, in Upper Silesia, also bordering on Moravia, according to the testimony of Brefeld, the first cases of cholera appeared August 9; almost at the same time, August 11, it broke out in the district of Ratobov, and spread further on "without any geographical connection"(?). At Glatz cholera appeared August 28, the total number of cases being 29; at Breslau, at the end of September, 287 cases. In the district of Breslau the cholera reached its highest point at the very time when it had almost disappeared in Bohemia. In November cholera disappeared in Silesia, the total number of cases being 884, out of which 431 died (Gezer, *History of Epidemic Diseases*, part ii., pp. 166–168).

In Russia, in 1851, cholera existed in the kingdom of Poland, in the government of Warsaw only. It broke out for the first time in the district of Sieradz September $\frac{6}{18}$. In October it appeared in some places of the Konin, Kalisz, and Petrikov districts; in the beginning of November it broke out in the Wielun and Leczyca districts; afterwards it again appeared in the district of Kalisz in November and December.

The districts of Konin, Kalisz, Syeradz, and Wielun are situated along the Prussian frontier; the latter districts join it. According to the opinion of local physicians cholera entered the kingdom of Poland from Silesia. This opinion is strongly confirmed by the geographical position of the districts visited by cholera, and by the time of its appearance in those places; the towns of Prague, of Breslau, of Kalisz, Tursk, and Kolo, are situated in almost a direct line from south-west to north-east.

At the end of December cholera in the kingdom of Poland decreased, one might almost say disappeared, because the number of persons attacked in 10 towns and four villages was only 196, out of which 96 died. It existed among the poorer classes of the population, living in low and swampy districts, subsisting on unwholesome food, especially on potatoes, which were diseased in that year.

Besides the above-named places in Europe, cholera appeared in 1851 in Pomerania, where Stralsund greatly suffered; the other parts of Europe were entirely free from cholera.

It would appear, therefore, that the cholera of 1851 was the direct continuation of the epidemic of 1849–50.

During the first weeks of 1852 one might say that there was no cholera in Europe, but this freedom from cholera was only apparent. The cholera poison was not completely eradicated, and on January $\frac{17}{29}$ it broke out afresh in the town of Varta, in the district of Kalisz, and afterwards on $\frac{\text{January } 22}{\text{February } 3}$ at the town of Turak. In both these towns cholera continued up to the middle of March. The number of sick was only 206 persons, out of which 77 died.

After this cholera disappeared, and it was only in the town of Zlochev, in the district of Syeradz, that it continued to appear from time to time in isolated cases, which very seldom ended fatally.

From May $\frac{12}{24}$ cholera greatly increased at Zlochev, and moreover it appeared in the neighbouring towns of Varta, Syeradz, Zdunska-Vola, Zgyerz, and Kalisz, but without any special threatening aspects. From May $\frac{12}{24}$ to July $\frac{8}{20}$ cholera appeared in four districts of the government of Warsaw, viz., Syeradz, Kalisz, Wielun, and Leczyca, where the number of sick was 322, out of which 166 died, The district of Syeradz suffered most, the number of its sick being 256 and dead 134.

In June cholera became slightly more virulent and spread to two new districts, viz., Piowkov and Rava; at Wielun it made no appearance in June; moreover, from $\frac{\text{June } 23}{\text{July } 11}$ [*sic*] it made its appearance at Warsaw where, from this date up to $\frac{\text{June } 30}{\text{July } 13}$, the number of sick was only 30, dead 9. The number

of sick in the five districts of the government of Warsaw, and in the city of Warsaw, in the course of June, was 1,206, out of which 589 died. In this month cholera spread also in Western Prussia, where the first case of the disease appeared in the town of Ostrov, situated close to the frontier of Poland. It appeared there on $\frac{\text{June } 21}{\text{July } 3}$, consequently earlier than in the town of Warsaw, but it appeared in Prussia sooner than it assumed in Poland any severe aspect; because up to $\frac{\text{June } 23}{\text{July } 5}$ the whole number of sick in the government of Warsaw was 615. Out of these 284 died. The districts of Kalisz and Syeradz, situated on the frontier of Prussia, suffered most. In Kalisz the number of sick was 714, dead 369; in Syeradz the number of sick was 330, dead 130.

In the month of July the cholera began to increase in all the districts of the government of Warsaw. The districts of Kalisch and Syeradz suffered most in this month also; at the town of Warsaw cholera reached an alarming height:—

——	Sick.	Dead.
In the district of Kalisz - -	2,689	1,461
„ „ Syeradz - -	2,290	1,018
„ city of Warsaw - - -	5,992	2,143

In the month of July the cholera not only spread into the other governments of the kingdom of Poland, but also entered the governments of Volhynia and Grodno in Russia; these two governments border on the kingdom of Poland. In the governments of Radom, Plotzk, and Lublin, cholera appeared in three districts, but in the government of Augustowo it appeared in one district only; the number of persons attacked with cholera was considerable in the government of Warsaw only.

July.	Sick.	Dead.
In the government of Warsaw -	14,998	6,292
„ „ Radom - -	375	115
„ „ Plotzk - -	132	46
„ „ Lublin - -	37	13
„ „ Augustowo -	3	2
„ „ Volhynia -	5	3
„ „ Grodno - -	18	9

In the month of August, cholera reached in the government of Warsaw its highest point; it also increased in the other governments, and spread among a larger number of districts. In the town of Warsaw it was equally severe in the month of August as it was in the month of July; it is true, however, that the number of sick was smaller, but the number of dead proportionately greater. In the month of August in the town of Warsaw the number of sick was 4,923, dead 2,465.

The following is a tabular view of the epidemic in the kingdom of Poland and in the governments of Russia:—

August.	Sick.	Dead.
In the government of Warsaw -	32,938	15,834
„ „ Plotzk - -	2,798	1,300
„ „ Radom - -	2,184	1,142
„ „ Lublin - -	1,489	501
„ „ Augustowo -	102	51
„ „ Grodno - -	659	203
„ „ Volhynia -	27	10

In the month of September, cholera began to decrease in the government of Warsaw, and increase in the other governments, but it did not reach in any of them to such a degree of virulence as it did in the government of Warsaw. The number of governments visited by it in Russia remained the same.

In the month of October, cholera spread in the following governments of the Russian Empire: Kovno, Minsk, Courland, Livonia, Esthonia, and St. Petersburg; consequently, it occupied the whole of the west of Russia. How destructive cholera was in European Russia, will be seen from the following monthly tables of its ravages:—

In European Russia.	Sick.	Dead.
In July - -	23	12
„ August -	686	213
„ September -	2,224	728
„ October -	1,619	620
„ November -	2,535	951
„ December -	2,571	905
Total -	9,658	3,429

On the whole, the severity of the cholera of 1852 in several parts of Russia varied. It reached, however, its height, not inferior in its fury to the first two epidemics, in the government of Warsaw only, as will be seen from the accompanying Table, where the number of sick and dead is given according to the governments, and the proportion of deaths to population in each:—

——	Sick.	Dead.	Deaths per 1,000 Population.
Governments of the kingdom of Poland—			
Warsaw - - - -	72,302	34,992	20·5
Plotzk - - - -	9,095	4,311	8·0
Radom - - - -	9,094	4,242	4·5
Lublin - - - -	11,034	4,143	4·0
Augustowo - - -	2,002	812	1·3
Total - - -	103,527	48,502	10·0
In the Governments of European Russia			
Grodno - - - -	4,283	1,387	1·7
St. Petersburgh - - -	3,685	1,449	1·3
Minsk - - - -	975	342	0·4
Kovno - - - -	581	165	0·2
Livonia - - - -	205	100	0·4
Courland - - - -	128	73	0·1
Volhynia - - - -	356	123	0·09
Vilna - - - -	82	28	0·03
Esthonia - - - -	69	9	0·03
Novgorod - - - -	49	19	0·02
Vologda - - - -	15	6	0·01
Total - - -	10,428	3,701	

(The number of sick and dead in European-Russia in this Table is greater than that shown in the preceding monthly table of the spread of this disease, because the cholera in the months of January and February, 1853, disappeared entirely in some of the governments.)

The spread of the disease in the districts of the government of Warsaw was not alike. It spread mostly in those districts which border on Prussia, or that are nearest to the Prussian frontier, as will be seen from the following Table, showing the number of sick and dead from May $\frac{12}{24}$ to November $\frac{15}{27}$:—

Government of Warsaw.	From the Outbreak of the Disease, May 12 (24) to Nov. 15 (27).		
	Sick.	Dead.	Deaths per 1,000 Population.
Districts:—			
Gostin	7,609	3,974	42·1
Vlotslav	5,619	3,372	28·6
Syeradz	6,791	3,313	27·1
Kalisch	7,436	3,936	26·6
Lovitz	6,337	2,604	24·4
Konin	5,030	2,695	19·6
Wielun	5,269	2,710	19·5
Leczyca	4,937	2,027	13·9
Petrokov	4,588	2,262	13·0
Rava	2,355	1,278	10·5
Warsaw (without the city)	3,518	1,412	9·6
Stanislav	1,534	623	6·8
Warsaw (city)	11,043	4,707	28·7
Total	72,066	34,913	20·4

(After November $\frac{15}{27}$, 1852, the number of sick and dead in the government of Warsaw became very insignificant. There were 236 cases of the former and 79 of the latter.)

It appears from the above Table that the district of Gostin was most violently attacked by cholera, and next to it Vlotslav; both these districts are situated on the left bank of the River Vistula.

The districts of Plotzk, Lipnov, and Pultusk, of the government of Plotzk, situated on the right bank of the River Vistula, were attacked by the cholera at the same time, but in a less degree, namely,—

	Sick.	Dead.	Deaths per 1,000 Population.
Districts:—			
Plotzk	2,113	1,152	11·7
Pultusk	1,763	784	8·1
Lipnov	1,462	681	7·0
Other districts of the government of Plotzk:—			
Mlva	1,668	677	8·0
Prasny	1,019	476	5·7
Ostrolenka	953	484	5·5
Total	8,978	4,254	7·7

After November $\frac{15}{27}$, 1852, the number of sick in the government of Plotzk was 117, dead 67.

The districts of Stanislav, of Warsaw, and of Rava, in the government of Warsaw, forming the eastern part of this government, were least attacked by the cholera as compared with the other districts of the same government. The district of Warsaw, in spite of its containing the greatest epidemic centre—the town of Warsaw, where 28·7 per thousand of the population died—retained in itself, with regard to cholera, the same characteristics as the eastern half of the kingdom of Poland which was attacked by the disease in a more mitigated form than the western, situated on the borders of Prussia. In the government of Radom, up to November $\frac{15}{27}$, cholera reached its highest development in the district of Opochin, where the number of sick was 2,397, out of which 1,247 died = 7·6 per 1,000 of inhabitants; in the district of Lublin, in the government of Lublin, the number of sick was 3,588, out of which 1,352 died = 7·5 per 1,000 of inhabitants; in the district of Augustowo, in the government of Augustowo, the number of sick was only 659, out of which 328 died = 2·6 per 1,000 inhabitants.

The whole of the above statistics show the great practical importance of the study of the influence of local circumstances on the spread of cholera, to which E. V. Pelikan endeavoured to draw the attention of the Constantinople conference by his statement that, to account for the spread of cholera, it is not sufficient to rely upon the present opinion of its transmissibility ("transmissibilité"), because there are many circumstances entirely unknown to us on which the epidemic spread of cholera depends.

We have not sufficient information concerning the gradual spread of the cholera on the other side of the Prusso-Russian frontier, but we have already seen that the time of the appearance of cholera in Prussia coincides with its first appearance in the kingdom of Poland. July $\frac{8}{20}$ cholera appeared in the city of Posen; at Berlin, from the end of July up to the $\frac{16}{28}$th of August there were only four cases of cholera. After that date cholera developed itself there as an epidemic. We are also ignorant of the localities visited by cholera, as well as of the proportion of fatal cases to the population, but there is not the slightest doubt that the cholera of 1852 in Prussia was one of the most severe epidemics. In its fury it was equal to that of 1831. In Prussia, Professor Gezer says that—

——	Sick.	Died.	Out of 1,000 Inhabitants.	
			Sick.	Died.
In 1831 -	53,844	30,923	7·70	4·42
In 1852 -	68,431	40,340	7·50	4·42

"In some localities (?), especially in villages," Professor Gezer says, "this time the disease reached fearful magnitude. There were cases in which more than one third of a village was attacked by cholera, and the rate of mortality reached sometimes 80 and even 90 per cent.!"—(Gezer, *History of Epidemic Diseases*, Part II., p. 170.)

Judging by analogy, it would be necessary to conclude that cholera reached its highest point in localities bordering on the kingdom of Poland, and at the same time situated on the left bank of the River Vistula; this may be confirmed by Dr. Gezer's statement that cholera entered Eastern and Western Prussia along the River Vistula. Thus the idea of the new spread of cholera in the kingdom of Poland will not bear investigation.

The entire area of European Russia, situated between our western provinces and Trans-Caucasia, bordering on the frontiers of Persia, was entirely free from cholera. The opinion of Professor Hirsch and other epidemiologists who have adopted this idea without critical investigation is untenable. At the same time we must note that the idea which gave rise to this opinion was the existence of cholera in Persia in 1852, and its appearance on the Persian frontier in Trans-Caucasia, *i.e.*, in an exceedingly small part of Russia, where the word Russia was applied to the whole of the empire, but no notice was taken of the enormous extent of its territories. Statisticians frequently fall into similar errors when they look upon an empire as a unit, without paying the slightest regard to its size and the number of its inhabitants. (*See* Map I.)

We will now investigate when and under what circumstances cholera appeared in 1852 in Russia on the Persian frontier. We have no correct information of the original appearance, progress, and spread of cholera in Persia in 1851–52, but there is not the slightest doubt that cholera did exist in Persia in 1852. From the moment that cholera in Persia began to advance towards the frontiers of Russia, the Russian Consul-General at Tabriz began instantly to report to the Russian Government the progress of the epidemic. It appears from the Consul's reports that in the summer of 1852 the epidemic reached the district of Azerbijan, and appeared in the town of Urmia, in which, in the course of the first 19 days, 215 persons died. (Reports of Russian Consul-General at Tabriz, July 1 to 7, 1852.) Afterwards the disease began to spread to the valley of Urmia, especially in the south, and reached Sulduz and Maragi (at least cholera was met with in the village of Satalmish, distance from Maragi 56 versts). At Sulduz about 60 persons died daily from cholera. It appears from the reports of the governor of Urmia to the Persian government that the number of persons who died of cholera in the district of Urmia

amounted to 3,000. (Report of Russian Consul-General, July $\frac{14}{26}$.) Afterwards cholera appeared at Salmaz and Khoi, and raged there rather severely. (Reports, September 11.) In the course of a month it began to abate. (Report, October 11.) In the beginning of October the epidemic reached the town of Tabriz and began to spread on the road to Nakhichevan. (Report, October 17.) In the course of a further week cholera began to increase at Tabriz, so that 100 persons died daily from the disease; at the same time, in villages situated along the road to Nakhichevan, it began to decrease, but it spread to Saraba, and reached Geshterud and Germerud. (Report, October 24.) At the end of October the number of persons dying daily from cholera reached 300; at the same time the epidemic spread in the direction—1st, Karadag, where it reached Agar and the neighbouring villages; and, 2nd, on the road to Teheran, where it reached Udzhan and Takmendash. (Report, November 3.) At the end of the year the cholera entirely disappeared from the town of Tabriz; the number of dead from cholera at that town was 12,300 persons. Towards the end of the year it again made its appearance at Agar, at Karadag, and continued to exist at Ardebil. (Report, January 5, 1853.)

There is not the slightest doubt, judging by the preceding reports, that in 1852 cholera existed close to the Russian frontier. Between October 17, when the Russian Consul-General reported on the progress of cholera on the Nakhichevan road, and October 24, when the Consul reported the decrease of this disease on the same route, there occurred the first case of the cholera attack at the town of Nakhichevan; on October 20, private Lukha Kharitonov, private of No. 5 battalion of the Grusian regiment of the line, was taken into the military hospital, smitten with cholera, where he died on the same day.

On the 25th October another private of the same battalion was attacked by cholera, taken to the hospital, and died five hours after admission. In the evening of the same day there were three privates of the same battalion attacked by cholera and taken to the hospital; out of this number one died on the following day.

Dr. Popov, who started for the town of Nakhichevan, consequent upon the outbreak of cholera, learned in the town of Erivan that in a Tartar village, Saderakakh, in the government of Erivan (three stations from the city of Erivan), cholera broke out. In consequence of this he stopped at the above-named village, and on the 26th of November personally attended to some of the sick and became convinced of the real existence of the disease; moreover, he was informed by Ali Sultan, the governor of the village, that cholera had appeared there 10 days before, that at first two persons were attacked by it, afterwards four, and then that the number of the sick gradually increased, so that by the 26th of November the number of sick was 65. Out of this number 36 died, four recovered, and 25 remained ill.

From the 20th of October to the 27th of November there were at the military hospital at Nakhichevan 16 cholera cases, out of which number seven died.

From the reports of Dr. Andreevsky, chief of the medical staff in the Caucasus, dated December 19, 1852, and January 10, 12, 1853, it appears that cholera broke out in the following localities:—

——	Broke out.	Disappeared.	Sick.	Dead.
District of Erivan:—				
Village of Sadurak -	November 15 -	December	70	43
„ Muganly -	Half November -	December	6	4
Winter quarters of Kustin	November 28 -	December 11	33	15
Khadoni-Tamir:—				
Village of Daval - -	December 5 -	December 13	20	9
City of Erivan - -	December 13 -	- - -	1	1
„ Ordubat - -	November 29 -	- - -	1	1
Shushin:—				
Village of Bekmenli -	Beginning December	- - -	4	4
„ Hadjali - -	Ditto - -	- - -	3	3
„ Gadjali - -	- - -	- - -	2	2
		Total -	140	82

The city of Ordubat, as well as the villages of Bekmenli, Hadjali, and Gadjali, are situated in the valley of the River Arax, close to the Persian frontier. On this account Dr. Andreevski concluded that the disease had always passed over from Persia, and did not spread from one part of the country into another, because those localities are separated one from another by a very great distance. It is possible to disagree with the conclusions arrived at by Dr. Andreevski, but there is not the slightest doubt that cholera had originally reached us from Persia through one or more places. Here we clearly see that the spread of cholera, if even out of Persia, does not present any serious aspect unless there exist temporary and local circumstances not yet determined which greatly assist the spread of the cholera poison. To assert that the spread of cholera from Persia in 1852 into Trans-Caucasia should have even the remotest relation to the development of the disease in the kingdom of Poland is out of the question.

The cholera epidemic of 1853 in the kingdom of Poland and in European Russia is a direct continuation of the disease of 1852. The advance of the disease in European Russia (without the districts of the Cossacks of the Don) will be shown in the following monthly lists of the sick and dead :—

1853.	Sick.	Dead.
January - -	2,528	949
February - -	922	408
March - -	1,903	786
April - -	3,608	1,516
May - -	4,289	1,901
June - -	12,538	5,223
July - -	73,358	30,269
August - -	104,041	40,318
September -	26,391	10,439
October - -	13,919	4,999
November -	4,362	1,766
December -	676	303

The governments of Kovno and St. Petersburgh (especially the city of St. Petersburgh), in which cholera began in the autumn of 1852, and continued to exist through the course of the whole of 1853, may be considered as the chief points where the cholera poison was conserved. The government of Volhynia, where the disease reappeared in January 1853, and the government of Moscow, where the epidemic began (in the city of Moscow), also in January 1853, may likewise be considered as the new central points from which the wide spread of cholera proceeded. The cholera of 1853 visited the whole of the governments of European Russia, and spread even into the governments of Western Siberia, so that, with regard to its extent, it was no less severe than the epidemics of 1831 and 1848; but as regards particular places visited by it in the above-named governments, and as regards its virulence, it may be classed among the number of rather weak epidemics. In few of the governments only it reached a certain degree of severity, which will be seen from the table below, showing the absolute number of sick and dead in each of the governments from the cholera of 1853, and the proportion of dead in every 1,000 of inhabitants :—

1853.	Sick.	Dead.	Deaths per 1,000 Population.
Kingdom of Poland.			
Governments:—			
Augustowo -	6,225	2,376	3·8
Lublin - -	2,846	1,241	1·2
Radom - -	742	353	0·4
Plotzk - -	155	76	0·1
Warsaw - -	378	209	0·1
Total - -	10,346	4,255	0·9

1853.	Sick.	Dead.	Deaths per 1,000 Population.
In European Russia.			
Governments:—			
Jaroslav - -	20,620	8,587	9·1
Esthonia - -	4,909	2,232	7·7
Volhynia - -	25,979	9,750	6·7
St. Petersburg -	17,273	7,175	6·5
Kostroma - -	10,212	5,480	5·4
Novgorod - -	7,680	3,686	3·9
Nijnigorod -	9,604	4,302	3·8
Kovno - -	9,382	3,217	7·7
Courland - -	4,935	2,003	3·7
Grodno - -	7,256	2,708	3·4
Moscow - -	10,357	4,327	3·2
Livonia - -	6,318	2,360	2·9
Vladimir - -	8,199	3,159	2·7
Tver - -	6,333	3,505	2·6
Archangel - -	1,222	599	2·6
Vitebsk - -	7,757	1,846	2·5
Vilna - -	5,957	1,917	2·4
Bessarabia - -	4,850	2,059	2·4
Kiev - -	10,232	3,608	2·2
Minsk - -	5,888	2,050	2·2
Pskov - -	3,046	1,212	1·8
Tchernigov -	5,033	2,080	1·5
Penza - -	2,765	1,574	1·5
Podolia - -	5,917	2,143	1·4
Samara - -	3,463	1,834	1·4
Astrachan - -	870	445	1·2
Kazan - -	4,611	1,451	1·1
Smolensk - -	3,672	1,186	1·1
Olonetz - -	663	312	1·1
Mohilev - -	2,388	827	1·0
Viatka - -	4,707	1,722	0·9
Orenburg - -	3,201	1,415	0·8
Poltava - -	4,836	1,441	0·8
Vologda - -	1,289	634	0·7
Simbirsk - -	2,318	767	0·7
Perm - -	3,419	983	0·6
Kaluga - -	1,194	522	0·5
Tambov - -	2,090	929	0·5
Ekaterinoslav -	1,214	456	0·5
Kherson - -	1,197	487	0·5
Saratov - -	1,132	660	0·4
Kursk - -	1,599	678	0·4
Tula - -	802	279	0·3
Riazan - -	909	422	0·3
Kharkov - -	1,154	389	0·3
Orel - -	547	281	0·2
Voronetz - -	679	338	0·2
Taurida - -	110	46	0·07
Total - -	249,788	100,083	
Western Siberia.			
Governments:—			
Tobolsk - -	3,971	1,783	2·1
Tomsk - -	754	312	0·7
Total - -	4,725	2,095	

From the above tables it will be seen that the western part of the kingdom of Poland, in which the cholera of 1852 was very severe, was very slightly

attacked by the cholera of 1853; at the same time even less than the eastern part. In European Russia the north-western provinces and the Volga provinces suffered most. Thus we must notice here also the influence of locality (as being in conjunction with known local temporary circumstances) on the development and spread of the cholera epidemic. The map sketch of the spread of cholera in Russia in 1853 shows this most vividly. See Map 2. Though the transmissibility of cholera as an exceedingly important agent, in connection with other auxiliary circumstances, in causing an extensive spreading of the cholera epidemic, made itself apparent in 1853 with singular force, we must admit that transmissibility alone does not explain why the cholera of 1853 spread throughout the whole of European Russia. It must consequently be conceded that the spread of the cholera poison circulates the epidemic only where the local and temporary circumstances are favourable to the further development of this disease.

Thus, for instance, as St. Petersburg, the cholera epidemic began in October, and continued uninterruptedly with more or less severity up to 1856. At that time the intercourse with Moscow by means of the railway was not interrupted, the transmissibility of the cholera poison was probable at any moment, and in all probability it was so transmitted, but it was followed by no evil results. On the 10th of January 1853 a patient was received at a hospital in Moscow who had been seized with cholera at one of the railway stations. His name was Osipov, and he had just arrived from St. Petersburg. In that part of the hospital where this patient was placed the cholera broke out on the 16th of January. Up to the 24th of January four patients who were already in the hospital, and one of the nurses, were attacked with cholera. On January 25 and 26 two nurses and another patient, and on the 28th of January a washer-woman of this hospital. It was also in the month of January that cholera broke out at Moscow. The whole of the country, however, between St. Petersburgh and Moscow remained free from cholera. At the commencement of the month of May cholera began to spread in the districts of the government of Moscow; in some of these districts the first persons who were attacked by cholera were those who had arrived there from the city of Moscow. At the town of Wenev, of the government of Tula, on the 31st of March, the first person who was seized with cholera was a veteran soldier who had just returned there from Moscow; in the district Epifan the first person sick of cholera was also one who had just arrived there from Moscow. In the governments of Novgorod and Tver, situated between St. Petersburgh and Moscow, the first persons attacked by the disease were those who had arrived there from St. Petersburgh.

In the government of Esthonia, on the 24th of May, the first person who was attacked by cholera was Mr. A. Von Stackelburgh, who had arrived there on the preceding day from St. Petersburg. He died on the following day. On the 28th of the same month his brother was seized with the disease.

In the month of May the battalions marching from St. Petersburgh to Warsaw brought cholera into the district of Luga, of the government of St. Petersburgh, and in the month of May (Messrs. Pskov and Ostrov) into the government of Pskov, and in the month of June the disease reached the government of Vitebsk.

In the month of June cholera was brought into the government of Olonetz by the religious pilgrims; the Alexandro-Svirsky monastery, where a large number of pilgrims assemble, served this time, as in previous epidemics, as the centre for the spread of cholera. The boatmen of the city of Ribinsk also brought the cholera. In the government of Archangel cholera appeared originally among the pilgrims who had returned in a vessel called St. Demetrius from the monastery of Solovietz into the city of Archangel; out of 130 pilgrims 10 were seized with cholera during the passage, and of these two died on the road and six after their arrival in the hospital.

The circumstances under which cholera was carried into the government of Jaroslav are not known, but on the 9th of June cholera appeared at the town of Rybinsk among the boatmen. It increased so rapidly that it produced quite a panic. In consequence of this, notwithstanding that contracts were concluded with the boatmen, there occurred considerable desertion among them, and some of the merchants, as, for instance, Mr. Suraslev, who was bound in that year to deliver corn into the St. Petersburg magazines, were

for some time placed in an exceedingly difficult position ; and even a question was raised by the government about the measures to be adopted against the desertion of the boatmen consequent on the spread of the disease. In the month of June, in the government of Kostroma, cholera broke out also among the boatmen on the River Volga, and afterwards spread into the neighbouring villages ; at the town of Kostroma the first four persons attacked with cholera were landed from steamers. In the government of Kazan the cholera appeared in the month of June, chiefly among the boatmen who had arrived from Rybinsk ; according to the testimony of one of the sick out of a party of 300 boatmen returning from Rybinsk, 30 died on the road. In the government of Simbirsk, in the beginning of July, the peasants who had arrived in ships were the first that were attacked by cholera. In the government of Penza a "burlak" (bargeman) who had just returned to his village was the first who was attacked by the disease ; his family was attacked next. In the government of Perm cholera broke out on the 17th of July, after the arrival of steamers from Kazan and Nishni Novgorod. In the government of Astrachan this disease appeared at the commencement of the month of July. As the Local Government Board of Health acknowledged that the cholera epidemic had been spread from the capital towns, the following question was raised, to which a confirmatory answer was given :—Would it be necessary to carry out quarantine regulations in order that cholera might not be allowed to spread into the provinces of Caucasus ? Cholera was brought by the emigrants from the interior governments of European Russia into the government of Orenburg on the 15th of July, Tobolsk on the 4th of August, and into that of Tomsk on the 16th of August.

In the governments of Courland (in June) and Vilna (in July) the first cases of cholera occurred at the postal station ; in the government of Minsk it occurred on the 18th of May on board ships which had arrived from the town of Pinsk, in the government of Volhynia. In the government of Podol cholera appeared on the 6th of June in a marching regiment, and among the bread bakers of the Selingin regiment, who had arrived at the town of Mohilev. In the government of Kiev it appeared on the 6th July at the town of Kiev among the working men who were engaged in laying down a suspension bridge. In the government of Kursk, on the 2nd July, the first person who was attacked with cholera was a peasant who had returned from Kiev from a religious pilgrimage. In the town of Kremenchug, of the government of Pultowa, cholera broke out on the 21st June among workmen who had arrived there in vessels on the river Dnieper.

But we need not quote any more of these facts in order to prove what an important part human intercourse plays in the spread of cholera under certain circumstances, even over countries of the greatest extent. A great number of such instances may be met with in every outbreak of cholera epidemic, and they would have been even more numerous had more attention been paid to the first circumstances of the earliest outbreak of cholera. But, on the other hand, human intercourse as regards the spread of epidemics loses all its importance when in a given place and in given time we do not meet with all the agencies which assist in the spread of the cholera poison. The cholera years of 1854–55 very clearly confirm this deduction. The appearance of cholera in 1853 in the Caucasus may be quoted as a no less convincing proof of the above statement.

In 1853 cholera continued to exist in Persia. From report (July 26) of the Russian consul at Astrabad it appears that cholera in the month of June broke out in the district of Astrabad, in the village of Gyaz (close to Astrabad), on the shores of the Caspian Sea, distant six versts from the bay. It is asserted that it was brought there from Mazanderan. In the month of August cholera greatly increased in that village, and spread to other villages in the direction of the town of Astrabad. (Consul's report, dated August 25.) In the month of September cholera appeared in the town of Astrabad, where a rather large number of people died of it. (Report, September 25.) In the month of November cholera disappeared both in the above-named town as well as its environs. (Report, January 16, 1854.)

In the month of July an inhabitant of Bakeu, Artemus Popov, engaged on the steam navigation service on the River Kur, died of cholera at Geok-Top, in the Caucasus. On the 23rd of July the wife of a quarantine officer died of

cholera at Beliasuver, in the district of Lenkoran, in addition to which four other persons were attacked with the disease. Cases of cholera attacks continued in this district in the course of the months of July, August, and September. At first it was questioned whether it was really cholera, but at the end of September it was unanimously agreed to be the Asiatic epidemic cholera. Up to October the disease existed in the district of Lenkoran only, but in the month of October it broke out in the town of Shemakh. Dyakov, an inhabitant of Lenkoran, who had arrived there, was one of the first smitten with the disease. In the month of November cholera appeared in the district of Shushin. The monthly returns of the spread of cholera from the official reports furnished by the governor of Shemakhin will be found in the following list :—

——	Sick.	Dead.
In June - -	21	5
„ August -	69	37
„ September -	115	47
„ October	518	202
„ November -	80	44
Total -	803	335

From the Reports of the Local Government Board of Health it appears that cholera existed during the above-mentioned months in the following places :—

——	Sick.	Dead.
Town of Lenkoran - -	36	19
District of Lenkoran - -	720	276
District of Shushin - -	14	11
Town of Shushin - -	10	5
District of Shemakhin - -	13	9
Total - -	793	320

(The difference in numbers of sick and dead from cholera in Transcaucasia in the above Reports is very insignificant, and in all probability arose from other diseases being confounded with that of cholera.)

To determine the question whence the cholera was brought into the district of Lenkoran, whether from Persia or from Russia, we have no means of ascertaining. We may assume the one or the other because, in the month of July, cholera existed on the shores of the Caspian Sea, close to Astrabad, and at Astrakhan. Moreover, this question loses a great deal of its importance from the fact that the disease spread only in a small portion of South-Western Transcaucasia. In the northern part of the Caucasus, that is, in the government of Stavropol, in the district of Mikhilof, not far from Stavropol, in the second half of the month of October, there were a few cases of cholera-seizure. (The actual number of persons attacked is not given in the Reports.) The persons who were first smitten with the disease were those who had just returned from the fair at Stavropol, where, in consequence of the fair, there was a great gathering of the people from localities where cholera existed, such, for instance, as from Rostof, on the River Don, from Novocherkask, &c. Thus it will be seen that the greatest part of the Caucasus was free from cholera, while those places that were attacked were isolated.

The appearance of cholera in 1853 in Western Europe must not be considered as directly resulting from the existence of cholera in the winter of 1852-53 in Russia. It must be granted that in Prussia those localities in which cholera existed during the winter served as nests for its place in the beginning of the ensuing summer. Thus, for instance, in the town of Breslau the disease stopped only on the $\frac{11th}{23rd}$ April, 1853. Professor Gezer says that

the $\frac{11\text{th}}{23\text{rd}}$ April was the last day of cholera in Prussia, but scarcely a month had passed when it broke out afresh in many places of Prussia. On the $\frac{31\text{st May}}{12\text{th June}}$ cholera broke out in Denmark and at Copenhagen, and already, by the $\frac{15}{27}$th June it reached its highest pitch. From Copenhagen it spread in all directions, but especially towards the north. The number of persons attacked by cholera in the whole of Denmark was 10,598. Out of these 6,888 died.

In England cholera appeared first in sea-side places. At Newcastle and Gateshead, afterwards in London, where, from the $\frac{25\text{th June}}{7\text{th July}}$ up to the end of October, 1,562 persons died.

In the month of August cholera appeared in Norway, but only in a few localities, especially however, at Christainia, whence it spread further along the sea-coast, and into the interior of the country. The number of persons attacked by the disease in the whole of the country amounted to 3,794; out of this 2,448 died, or 5·5 per cent. per 1,000 of inhabitants. In the month of August cholera broke out in Holland, Belgium, and France. In September it appeared in Switzerland, where the number of persons attacked by it was 17,327, and dead 8,775.

On board 28 ships which sailed in 1853, at the time of cholera, from England, Holland, France, Bremen, and Hamburgh, with 13,762 passengers, and arrived at New York in America, there died from cholera during the passage 1,141 persons, or 83 out of every 1,000. The cholera was raging most furiously on board these ships whilst they were within certain degrees of latitude and longitude, and decreased when the ships approached the coast. (Gezer; *History of Epidemic Diseases.*)

We have seen by this time that the cholera of 1853 chiefly raged in Northern Europe, or perhaps it would be more correct to say, in the north-western part of Europe.

In the winter of 1853–54 remains of cholera were observed in all those places where it existed in 1853. With the arrival of warm whether out of these remains there again broke out in Europe a fearful epidemic, so that the cholera of 1854 we may consider without the slightest hesitation as the direct continuation of that of the preceding year.

The spread of cholera in European Russia, month by month, in 1854 was as follows:—

1854.	Sick.	Dead.
January - -	493	229
February - -	171	84
March - -	241	120
April - -	537	239
May - -	1,067	505
June - -	3,018	1,274
July - -	6,080	2,764
August - -	10,471	6,554
September -	3,126	1,715
October - -	1,264	587
November -	940	376
December -	829	385
Total -	28,239	13,832

At the commencement of 1854 cholera had ceased in Russia, both in the kingdom of Poland as well as in all the governments of European Russia, with the exception of St. Petersburgh, where it continued uninterruptedly, and, from the month of March, slightly increased. In the month of April it appeared in the government of Tver and of Livonia. Ivan Dimentev, a peasant, travelling from St. Petersburg by railway, was the first who was attacked with cholera in the town of Tver and generally in the whole of the government of Tver; he was attacked with the disease whilst travelling. On the 31st of March he was sent to a hospital, where, on the 2nd of April, at 10 o'clock in the morning, he died. At the hospital, in consequence of want of room, this peasant was placed in the general room, by the side of another peasant, Peter

Federov. On the day of the death of the former, *i.e.*, on the 2nd April, the peasant Peter Federov was attacked with cholera also, and in the evening of the same day he died. On the 10th and 11th of the same month, two patients in the same hospital were attacked with cholera. Afterwards five passengers attacked with cholera, and travelling from St. Petersburgh, were brought from the railway to this hospital, and on the 20th of June another person seized with cholera on a steamer which had arrived from Rybinsk,

In the month of June cholera appeared in the governments of Esthonia, Novgorod, Pskov, Jaroslav, Kostroma, Samara, Nijnigorod ; in the month of July, in the governments of Olonetz, Vladimir, Moscow, Kasan, Simbirsk, Saratov, Orenburg, and Astrakhan. Consequently, cholera spread along the whole bed of the River Volga. In the same month it also spread in the Western governments, that is to say, it appeared in the governments of Kurland, Kovno, Vilna, and Vitebsk; in the month of August it appeared in the governments of Grodno, Poltava, and in the kingdom of Poland, in the government of Augustowo, where it passed from the government of Kovno bordering upon it.

On the whole, the cholera of 1854 in Russia belongs to the number of very weak epidemics. In the whole of the kingdom of Poland the number of persons attacked was 3,286, out of which 1,806 died. In European-Russia it appeared in the following governments :—

1854.	Sick.	Dead.	Deaths per 1,000 Population.
Governments:—			
St. Petersburg -	8,305	3,618	3·4
Moscow - -	5,106	2,848	1·9
Esthonia - -	1,198	523	1·8
Astrakhan - -	1,084	620	1·6
Kovno - -	2,350	1,055	1·2
Courland - -	711	343	0·6
Vilna - -	919	433	0·5
Jaroslav - -	989	510	0·5
Samara - -	1,060	625	0·5
Novgorod - -	596	325	0·4
Nijni-Novgorod -	725	430	0·4
Orenburg - -	825	512	0·3
Livonia - -	430	220	0·3
Tver - -	868	409	0·3
Orel - -	528	264	0·2
Taurida - -	346	141	0·2
Saratov - -	345	243	0·2
Vitebsk - -	330	107	0·1
Grodno - -	203	104	0·1
Kostroma - -	213	89	0·09
Pskov - -	64	39	0·06
Smolensk - -	178	53	0·05
Vladimir - -	136	63	0·05
Kazan - -	171	44	0·03
Simbirsk - -	32	20	0·02
Perm - -	141	39	0·02
Kherson - -	83	20	0·02
Kaluga - -	64	20	0·02
Poltava - -	24	13	0·01
Penza - -	11	7	0·01
Vologda - -	11	5	0·006
Olonetz - -	6	1	0·004
Total - -	28,052	13,743	

The geographical relation between the governments smitten with cholera shows, notwithstanding the weakness of the epidemic, a certain regularity, and indicates that the cholera epidemic, in spite of transmissibility, depends upon certain physical laws which limit the bounds of this transmissibility.

In Persia, in 1854, the spread of cholera was very moderate (Gezer). Close to the Russo-Persian frontier there was no cholera at all. From reports of the Russian Consul in Persia, it appears that cholera broke out at Teheran at the end of the month of September, that is, at the time when the bodies of dead were dug out of the ground with the view of being sent to holy shrines. They were the bodies of those persons who died at Teheran from previous cholera; and the cholera ceased as soon as the exhuming of the bodies ceased. Places through which the caravan carrying these bodies passed also suffered from cholera. Dr. Cloquet, physician to the Shah, stated that in this year cholera broke out at Teheran simply through the exhumation of these bodies.

In Western Europe the cholera of 1854 assumed gigantic proportions, and raged chiefly in the south-western part of the European continent. In the north of Europe cholera existed in a small degree. In the whole of Sweden the number of persons attacked by cholera was 3,038 only; out of these 1,212 died. In Northern Germany cholera hardly existed at all. In England the disease was comparatively slight.

In France the cholera reached its highest degree of virulence, which may be seen from the following statements quoted by Dr. Tholozan, in his pamphlet, from a "*Résumé des Rapports sur les Epidémies de Cholera Morbus des années* 1854 et 1865," by Dr. M. Barth: "The epidemic of 1832 attacked "56 departments, and ended in the same year, having destroyed from 110,000 "to 120,000 human sacrifices. The cholera of 1849 attacked 57 departments, "and destroyed by the end of the same year from 100,000 to 110,000 persons. "The epidemic of 1854, on the other hand, began at the end of October, "1853, and apparently in a short time died out, but in the month of March "it broke out again, quickly spread through the 70 departments, and only "ended in the following year, when the number of its victims was above "140,000 human beings."

In 1854, from reports furnished by Professor Gezer, it appears that cholera infected 4,893 "communes," in which 125,725 persons died. It will be seen from the above that the cholera of 1854 in France, belongs to the most furious epidemics.

In Italy, as Gezer says, cholera reached an unheard-of pitch. In the kingdom of Sardinia, in 1854, the number of persons attacked with cholera was 45,000, out of whom 24,000 died. In Sicily cholera committed fearful havoc. In Lombardy the disease did not reach a very high degree; the whole number of sick was only 3,116, of dead 2,128. In Bavaria the number of sick was 14,874, dead 7,370. Besides this, cholera existed in Spain, Switzerland, Austria, Turkey, and Greece.

In the winter of 1854-55 cholera continued in many places, although in a small degree. With the approach of the warm weather the disease renewed itself with its former power, but in this year as well as the preceding it elected new localities for its most furious attacks. This time Austria became the victim. In Austria, says Drasche, the number of persons attacked with cholera was 662,814, out of whom 270,915 died (Gezer). In Austrian Galicia the number of persons attacked was 128,213, out of whom 52,304 died; with regard to the whole population the number of sick was 27·8 per 1,000 inhabitants. Here we must remark that the eastern part of Galicia was attacked by cholera in a higher degree. The number of sick attacked by it was 30·2 per 1,000, whilst that in the western was 23·7 per 1,000 of the inhabitants (Drasche). The total number of dead in Galicia, with regard to the whole population, was 11·34 per 1,000 inhabitants.

In the Kingdom of Poland the epidemic of 1855 produced considerable havoc; the total number of sick being 77,539, and of dead 39,563. In that year cholera mostly raged in the eastern part of Poland, especially in the government of Lublin, which suffered more than any of the other governments, and where almost half of the above-named casualties occurred. The government of Augustowo suffered least of any. In the town of Warsaw the disease did not reach by far such a degree as in 1852; the total number of persons attacked by cholera in that town was 4,053, of whom 1,780 died.

In European Russia cholera appeared in 35 governments, but not everywhere with the same virulence. The intensity of the epidemic, as expressed in the proportion of dead to the whole of the population in different governments, varied considerably. The epidemic reached its greatest intensity in European

Russia in those localities which border on Austrian Galicia, and form with it one and the same plain.

1855.	Sick.	Dead.	Deaths per 1,000 Population.
Governments:—			
Volhynia - -	41,161	16,357	10·9
Tchernigov -	35,990	15,331	10·9
Minsk - -	25,395	9,264	9·4
Orel - -	23,674	10,440	7·2
Kiev - -	27,113	10,724	5·9
Podolia - -	25,527	10,084	5·2
Grodno - -	11,925	4,825	5·8
Kursk - -	21,012	9,202	5·0
Taurida - -	7,796	3,309	5·0
Kharkov - -	18,263	6,154	4·8
Ekaterinoslav -	13,172	4,382	4·2
Poltava - -	17,764	6,421	3·7
Kherson - -	11,517	3,970	3·7
Bessarabia - -	8,826	3,598	3·6
Mohilev - -	7,921	2,633	3·0
Vilna - -	7,048	2,410	2·9
St. Petersburg -	5,440	2,936	2·8
Esthonia - -	724	577	2·0
Kaluga - -	4,758	1,711	1·7
Moscow - -	4,923	2,259	1·5
Smolensk - -	3,476	1,262	1·2
Kovno - -	1,359	617	0·6
Tula - -	2,306	645	0·6
Novgorod - -	929	421	0·5
Vitebsk - -	753	271	0·4
Courland - -	453	211	0·4
Livonia - -	502	231	0·3
Voronetz - -	1,392	623	0·3
Nijnigorod -	297	175	0·1
Jaroslav - -	258	114	0·1
Vladimir - -	181	79	0·06
Tver - -	125	61	0·04
Olonetz - -	20	9	0·0
Kostroma - -	17	10	0·01
Riazan - -	8	8	0·006
Total - -	331,025	131,327	

The spread of cholera in 1855 by months will be seen from the following Table:—

1855.	Sick.	Dead.
January - -	949	606
February - -	586	356
March - -	753	409
April - -	943	482
May - -	4,262	1,731
June - -	49,038	20,930
July - -	139,983	52,554
August - -	112,529	44,114
September -	17,144	7,735
October - -	3,052	1,465
November -	1,169	590
December -	101	75
Total -	330,509	131,047

In the winter of 1854–55 the disease had continued chiefly in the three governments of St. Petersburgh, Novgorod, and Esthonia. In the month of April it appeared in two other governments, viz., Orlov and Kherson; it broke out first in the town of Nikolaiev, in the government of Kherson, among six soldiers sent from Sebastopol. In the month of May cholera appeared in the kingdom of Poland, that is, in the government of Lublin, in the early part of this month, and in the town of Warsaw and the government of Radom, in the middle of May. In the same month cholera appeared in European Russia in twelve new governments. In the government of Vilna it broke out in the first-half of the month of May, in the district of Kovel during the march, from the kingdom of Poland, of the grenadier division, with recruits. Of these soldiers, 408 men attacked with cholera were sent to the town hospital at Kovel, where 115 of their number died; only 13 persons out of the whole population of that town were attacked with cholera, and three died. The same division spread cholera in other towns situated along the line of march. Thus into the military hospital of Lutz, the division sent 70 men attacked by cholera, and into that of Dubno 31, of whom 8 died. 45 men were sent to the hospital at the town of Rovno, out of whom 23 died. In the district of Baltsk, of the government of Podolia, cholera appeared for the first time in the 4th and 5th divisions of the second Infantry corps, which were then on the march. At the town of Pinsk, of the government of Minsk, it broke out among the reserve regiment of Jagers who were also on their march. On the 11th of May Dr. Schultz, chief medical officer of the district of Jaroslav, arrived at the city of Dorpat, in the government of Livonia. On the 13th of the same month he was attacked by cholera, and on the 20th he died. On the day of his death the daughter of a notary, 17 years of age, residing in the same house where Dr. Schultz lived, was attacked by cholera and died the same day. It is necessary to note that, in the months of May and June, cholera did not exist in the government of Jaroslav, and if we did admit that Dr. Schultz was under the influence of the cholera poison before his arrival at Dorpat, we must admit also that it must have been contracted somewhere during his journey through the governments of Novgorod and St. Petersburg.

The whole of the above statistical information referring to the cholera epidemic of 1852–55 shows that this epidemic belongs to the greatest class of epidemics, and fully deserves the name of the "Third." It cost Europe more than 1,000,000 of persons who became its victims. This, then, is the fatal result to which Europe has been subjected from the petty remains of a past cholera epidemic. This great epidemic places it beyond all doubt that, as long as there exists on the continent of Europe, be it even in the least degree, the cholera poison, there exists also danger for the health of all the European countries. From the monthly tables of the spread of cholera it is clearly shown that it consists of a regular series of increasing and decreasing virulence. The maximum of the disease reaches its height in the summer, and the minimum in the winter months. In winter not only is the number of victims of the epidemic insignificant, but also the number of localities in which cholera breaks out is limited. This time of the year seems to be the best for the adoption of measures calculated to destroy the cholera poison with the least inconvenience to society. It is evident that the whole burden of inconvenience and expense should not fall exclusively upon that portion of the community only in the midst of which the cholera continues to exist, but should be equally borne by all whom the danger threatens. If that is granted, we may be confident of success.

With the arrival of the hot season of the year, cholera, if there are other favourable local conditions for its development, assumes such wide dimensions, and reaches such a degree of virulence, that society's battle with it becomes almost doubtful, the means of defence being insufficient. The movement of the central point of the epidemic in 1852–55, as well as the formation of such a central point in 1852 from the remains of the past epidemic in Western Poland and Eastern Prussia, must not be ascribed to the influence of human intercourse or other changes that may have taken place in the social and hygienic conditions of the population.

In 1853 the centre of the epidemic was already in the North, in 1854 in Western, and in 1855 in Southern Europe, so that the centre of the epidemic

had made, we might say, in that period of time a complete circular movement throughout the continent of Europe. The epidemic of 1852–55 shows in a most convincing manner that the transit of cholera infection or poison is only dangerous when in a given locality there exist all the favourable conditions for the further spread of this poison. If such favourable conditions do exist, then the quarantine measures cannot prevent the transit of the cholera poison; but if they do not exist, then the cholera poison cannot acquire fixity, and the epidemic will not spread, in spite of human intercourse; consequently the quarantine measures in this case are useless.

Thus it will appear that the task of modern epidemiology is to discover what local and temporal circumstances assist the spread of the cholera poison; or at least to discover the means of knowing from certain appearances in a given time the capability or incapability of a certain locality for the spread in it of that poison. Professor Pettenkofer showed the periodical changes of the rise and fall of the level of the ground-water and its connection with the cholera epidemic. Professor Buhl and others show the dependence of the spread of enteric fever on the fall of the level of the ground-water; and lastly, Middendorf, whilst making researches on the Siberian plague at the time of his journey through the steppes of Baraba in Siberia, gives the moisture of the soil as one of the causes of the rise and spread of the Siberian plague. (*Transactions of the Academy of Sciences*, vol. xix.) A hot and sultry summer, he says, is necessary for the outbreak of the Siberian plague in a locality subject to the epizooty. Endeavouring to discover the connexion between the plague and the moisture of the soil, he heard from the inhabitants of Baraba that the Siberian plague is to a certain degree periodical, and that its periodical appearance depends upon the periodical rise and fall of the level of the water in the lake of Gana. Similar changes in the level of the water were observed in other inland lakes of the Aral-Caspian valley, viz., in the Lake of Ala-kul, in the Kirghese steppes, and in the Aral and Caspian Seas. The attention of Russian physicians has been for a long time past called to the coincidence of the epizootics of plague with the epidemics of cholera; this may be regarded as a confirmation of Middendorf's deduction. The changes in the level of the ground water exercise an undoubted influence on the moisture of the land, and by this means on vegetation; consequently, all investigations respecting the rise and fall of the level of the ground water will have the same practical importance for the agriculturist as other meteorological observations. Everything shows the value of such investigations, and since they cannot be undertaken by private enterprise alone, it is incumbent upon the Government to take the first necessary steps for the purpose of organising stations where observations of this kind might be carried out.

The results to which our investigations of the great cholera epidemic of 1852–55 have led us may be summarised under the following heads:—

1. The cholera epidemic is caused by the appearance (through transit) and spread of a special agent—the cholera poison. In that sense the epidemic of 1852–55 is a direct continuation of former epidemics.

2. The decrease and final disappearance of the cholera depends upon the removal of the possibility of the spread of the cholera agent, and not upon its self-exhaustion or change of its qualities.

3. There are certain peculiar temporary and local changes in the soil, not yet known, which, appearing in a certain locality, make that place a receptacle for the cholera poison.

4. These changes constitute the *conditio sine quâ non* of the existence of the epidemic. The degree of the spread of the epidemic depends upon the degree of the development of these changes.

5. The high state of temperature constitutes one of the most important auxiliary conditions. When the highest temperature of the year coincides with the highest degree of the changes of the soil, then the epidemic reaches its greatest virulence; on the other hand, during a low state of temperature the epidemic becomes confined, and does not reach a high degree of malignity.

6. Homogeneous changes in the soil of the land take place simultaneously in more or less extensive districts; and thus the transit of the cholera poison from the points of its existence to fresh localities is clearly

accounted for; in the latter it becomes the actual momentum for the spread of cholera.

7. The hygienic conditions of a locality constitute exceedingly important elements in the development and spread of cholera; but these elements, after all, are only secondary; without the existence of the corresponding changes in the soil they could not be the cause of the outbreak and spread of cholera.

8. Remains of the old cholera epidemic deserve the same particular attention as the fresh introduction of the cholera poison.

9. The changes in the rise and fall of the level of the land water exercise a considerable physico-chemical influence on the soil, and consequently, according to all appearances, they either directly or indirectly prepare the soil for the reception and spread of the cholera poison.

10. Minute investigations of the rise and fall of the level of land water promise to elucidate many dark spots in the etiology of the cholera epidemic.

In conclusion, I beg to offer a few remarks on the method adopted by me whilst investigating cholera epidemics. The unit accepted by me for the comparison of the *size of the localities* infected with cholera is the official unit,—a "government;" the unit of *time*, the period of a year; and the unity of *intensity* of the cholera, the proportion of the dead from the disease in a given government to the whole population of that government. Such a method of investigation has its advantages and disadvantages. Its advantages consist in this, that small particulars do not darken the general character of the distribution of the epidemic, and clearly point out the existence of a special agent having influence on the intensity of the epidemic; but such a method is evidently insufficient if we apply it to the investigation of the influence of the locality itself, its physical nature, geological formation, &c. Such a unit of the locality as a government is too large. Moreover, in the investigation of the spread of cholera, a shorter period should be taken for the unit of time, say a month, since the locality infected with cholera as well as the virulence of the disease, change in every month. Thanks to the assistance of Mr. E. V. Pelikan, I hope shortly to be able to publish such minute investigations.

The statistical information quoted by me referring to Russia has been compiled from the official reports of the governors of governments and medical inspectors; that concerning the kingdom of Poland has been compiled partly from official reports and partly from an extract made by the medical inspector, Dr. Becker, from the annual reports of the late chief medical department in the kingdom of Poland.

Note B.

Memorandum by Dr. Tholozan, Physician to the Shah of Persia, on Cholera in North-East Persia in the years 1867–69.

Route de Teheran à Méched; exploration faite par Mirza Moustafa, Elève du Collége Médical de Teheran.—Ce mémoire comprend une partie hygiénique et topographique que je supprime ici; je ne mentionne que les dates d'invasion du choléra, telles que l'observation en question les a relevés et telles qu'elles ont été communiquées par moi en 1870 ou 1869 à MM. les médecins sanitaires de Russie et de Turquie délégués à Teheran.

Dans les années 1867, 1868, 1869, le choléra parut sur la route de Teheran à Méched dans un grand nombre de localités au commencement de l'été ou à la fin. Je mentionnerai ici les principaux points, omettant les petits villages, dans lesquels en général la maladie se développa presque en même temps que dans les centres de population plus considérables situées aux environs.

1. Khatounabad (40 maisons), à 5 lieues à l'est de Teheran. En 1868 le choléra s'y déclare en Juin; il dure deux mois dans le district environnant. Il fut plus grave cette année qu'en 1867.

2. Heivanekief, tonjours en avançant vers l'est (700 à 800 habitants). Le choléra y fut plus fort en 1867 qu'en 1868 et 1869.

3. Khor, district contenant une centaine de villages. La maladie s'y comporta comme dans le district précédent.

4. Dehnémek (25 maisons), toujours en avançant vers l'orient. En 1867 il n'y eut pas de choléra. En 1868, choléra au milieu de l'été (12 décès). En 1869 de nouveau choléra (5 décès).

5. Lasguird. Choléra intense au milieu de l'été 1867. Moindre en 1868, où il débuta au commencement des chaleurs (Juin) et causa 30 décès. A la fin de l'été 1869 quelques décès de nouveau.

6. Sourkeh, à l'est du précédent, eut le choléra en 1867, 1868, 1869, à la fin de l'été.

7. Semnan, 12,000 habitants. En 1867, 1868, et en 1869 le choléra y parut la fin de l'été.

8. Plusieurs villages assez peuplés situés sur la route entre la localité précédente et la suivante furent aussi attaqués dans ces trois années.

9. Damghan (8,000 habitants). Choléra dès le premier mois d'été (Juin) dans ces trois années. Il a une durée de deux à trois mois, et fut moins intense en 1869.

10. Chahroud (10,000 à 12,000 habitants). Pendant chacune des trois années il y eût le choléra. Deux mois de durée. Intensité moindre en 1869.

11. Sedkourk. C'est le premier village du district de Sebzevar. Il y eût là le choléra au commencement de l'été 1868. La maladie n'y avait pas paru en 1867.

12. Bachten, bourg du district de Sebzevar. Choléra en 1867, 1868, 1869, décroissant d'intensité chaque année.

13. Sebzevar (15,000 habitants). On ne mentionne spécialement que le choléra de 1869, qui commença dans l'été, et dura trois mois en causant deux à trois décès seulement par jour. Mais en 1867 et 1868 le choléra a régné durement dans cette ville.

14. Nichapour (20,000 habitants), dans une magnifique plaine qui contient 600 villages. Choléra en 1867, 1868, 1869, chaque année; il ne dura que deux ou trois mois.

A ce document il est nécessaire de joindre les faits suivants relatifs à Méched et à Téhéran, située chacun à chaque extrémité de la route :—

Méched.—Le choléra, venu en Perse à la fin de 1865 et au commencement de 1866, atteignit cette ville dans sa marche de l'ouest à l'est au commencement de Décembre 1867 ; il y dura deux mois en donnant lieu à 40 ou 50 décès par jour. (J'étais moi-même à Méched l'été 1867, et il n'y avait pas de choléra à cette époque.) De Méched la maladie se porta encore à l'est, en se dirigeant vers Hérat, et elle atteignit Khof, localité située sur la frontière orientale de la Perse ; c'était en 1868. La maladie dura trois mois à Khof.

Dans la même année, 1868, il y eût à Méched et dans les villages environnants un choléra (recrudescence, dans ma pensée, de celui de l'année précédente) qui dura en Juin, Juillet, et Août.

C'est cette même année que Hérat fut atteint. J'ai appris ce fait vers la fin de l'année par une communication de Mr. Alison, Ministre d'Angleterre. Je suppose que l'invasion y eût lieu au plus tôt à la fin de l'été.

Téhéran, qui avait été atteint en 1867 par la marée cholérique venue du nord-ouest, fut de nouveau et cruellement éprouvé en 1868. Le choléra y présenta trois recrudescences ; elle y débuta avec l'été (Juin).

A côté de ces faits en voici un autre important, parce qu'il a été bien observé :—

(*a.*) Boudjnourd, sur la route de Téhéran à Méched (c'est-à-dire vers le milieu et au nord de la route ordinaire), ville de 5,000 à 6,000 habitants. Le choléra fut assez intense en 1868 ; il débuta en Avril au plus tard.

Les faits relatifs au Mazenderan sont les suivants :—

Au printemps 1867, et peut-être même dans les mois d'hiver de cette année, la vague cholérique atteignit ce pays avant Téhéran. Les localités élevées et montagneuses furent peut-être plus frappées que le bord de la mer.

Astérabad, situé à l'extrémité est du pays, fut légèrement atteint au commencement d'Août 1867. Puis la maladie disparut pour reparaître avec force dans l'automne 1868 sur les tribus Turcomanes du voisinage de l'Atrek (Yamoutes). Sur un régiment de 900 hommes à Astérabad il y eut huit cas de choléra et deux décès.

Le choléra, qui avait paru en 1867 dans les villes de Sari, Amol, Barfourouch, s'y développa de nouveau en 1868. En Mai 1868 il existait déjà à Amol. Il

se déclara à Sari, situé à l'est, dix jours après Barfourouch, situé à l'ouest. Amol est entre les deux villes précédentes.

Dans le district de Zérénd, situé sur la route de Téhéran à Hamadan, j'ai reconnu par moi-même en 1870 que le choléra avait existé en 1867, 1868, 1869, à l'époque de la moisson.

North-East Persia, 1867-69 Dr. Tholozan.

Le choléra dans l'année 1868 se montra aux environs d'Isfahan, à Kerman, à Yezd, à Hamadan (Hamadan, 20 Novembre ; Isfahan, fin Novembre ; Yezd, 13 Septembre ; Kerman, 20 Octobre.)

La ville de Tauris, fortement atteinte en 1866, ne présenta dans l'automne 1868 que quelques cas de choléra léger ; tous ont guéri.

South Persia, 1865-69, Major St. John.

Note on Cholera in South Persia.—The following note respecting cholera in South Persia has been received from Major St. John, R.E., of the India Office, who was on special service in South Persia at the period referred to in it :—

"In the autumn of 1865 there was cholera in the warm region south-east of Shiraz, namely, Fasa, Darch, and Lar. A few isolated cases occurred in Shiraz, but the cold weather coming on no outbreak took place, There was no more cholera in South Persia till 1869, when it reappeared in the same district, south-east of Shiraz, in May and June. At the end of the latter month it broke out with great violence at Shiraz, but whether brought from the infected districts to the south-east, or by a large camp which simultaneously arrived from Teheran, is difficult to say. At least a tenth of the inhabitants of the district of Shiraz, that is, the city and neighbouring villages, were carried off. Very few able-bodied men of any but the lowest class were attacked. It was especially fatal to children and old women, and to Africans. Indeed, hardly a negress (one of whom is found in every respectable Persian house) is said to have survived."

Note C.

Memorandum on the Prevalence of Choleraic Disease in the Basin of the Mississippi in 1873.

Basin of the Mississippi, 1873.

In 1873 there was a considerable prevalence of fatal choleraic disease in the basin of the Mississippi. The disease first showed itself in New Orleans in February, and afterwards it appeared in numerous localities along the course of the river and its affluents, in some places causing a large mortality. For example, in Memphis, Tennessee, of 522 deaths, of which an account has been recovered, occurring in the six weeks from the 1st June to the 12th July, 212 were assigned to cholera. The history of the disease and of its distribution is exceedingly imperfect. The most important information relating to it yet published, has been collected by the *American Public Health Association* and printed in the Association volume of reports and papers for 1873.* These include several reports on local occurrences of the disease, a "Report "upon the course of Cholera through 200 Towns and Cities in the Missis- "sippi Valley," by Dr. Adoniram B. Judson, of New York ; and "An Account "of the Epidemic of Cholera during the Summer of 1873 in 18 Counties of the "State of Kentucky," by Dr. Ely MacClellan, of the United States Army Medical Staff. Dr. Judson's report, which is illustrated by a carefully prepared map, embodies facts "which have been derived chiefly from daily and weekly "newspapers of the towns in which cholera made its appearance, and from "manuscript reports of trustworthy medical observers, forwarded to the secre- "tary of the American Public Health Association." Dr. Mac Clellan's paper is compiled from the personal recollections of medical practitioners in affected

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* Public Health : Reports and Papers presented at the Meetings of the American Public Health Association in the year 1873. New York, 1875.

localities, very soon after the subsidence of the disease, few, if any, of whom had kept, as he is careful to state, records, or had any notes of the cases they observed, made at the time of their occurrence. This imperfection of data greatly obscures the questions which have arisen concerning this prevalence of disease, in so far as the causes of its particular distribution in the basin of the Mississippi are concerned.

I had intended to have prepared a summary of the reports and papers contained in the volume of Transactions of the American Public Health Association referred to, and of the report of the Louisiana State Board of Health on the occurrence of "cholera" in New Orleans in 1873; but I have recently learned that a report has been prepared on the whole subject, under the authority of the United States Congress, and is about to be issued. As this report will no doubt supply the data which have hitherto been wanting, it will be sufficient for me here, with one exception, to direct attention to its near publication.

The exception relates to the first appearance of the choleraic disease at New Orleans. There appears to be a common consent in opinion, that the occurrences of the disease, in various localities along the course of the Mississippi, followed in a certain succession after the appearance of the malady in New Orleans. This is shown in some detail in Dr. Judson's report, and if the communications made to Dr. Mac Clellan are to be accepted, there can be little doubt that the successive appearances were due to successive infections. Opinions on this subject have, however, been very much governed by the notions entertained by different observers of the nature of the disease. How diversely this has been regarded is well illustrated by the certificates returned in the cases of death from it in New Orleans. The following nomenclature was indifferently employed by various practitioners: *Cholera morbus*,* *cholera spasmodica*, *cholera sporadica*, *cholera nostra*, "*apparently cholera*," *cholera Asiatica* (this latter term "infrequently"). It is admitted, however, that the disease designated by these several names was one and the same malady.

According to the *Annual Report of the Board of Health to the General Assembly of Louisiana*, 1873, (C. B. White, M.D. President,) "cholera," that is, the disease under consideration, appeared first in the United States in 1873, at New Orleans.† The history of each of the first 25 cases, it is stated, was submitted to careful inquiry as to importation, portability, and infectiousness, embracing all particulars with reference to contact with passengers or their baggage, the washing of clothes from persons on shipboard, &c. The particulars relating to these cases are given in some detail, but I do not repeat them here as they give no help in enabling a judgment to be formed as to diagnosis, and the results arrived at as to the causes determining them are stated with sufficient explicitness in the summary of the board's conclusions. The first death from the disease occurred on the 9th February, the last on the 21st February. Within that period the number of deaths registered from choleraic disease

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* The term *cholera morbus* is used in the following sense in the United States. "The term cholera," writes Dr. George B. Wood, (*A Treatise on the Practice of Medicine*, Art. *Cholera Morbus*, vol. i., p. 803,) "is given to any complaint in which "the prominent characters are simultaneous and repeated vomiting and purging, "with painful spasm of stomach and bowels, and occasional cramps of the external "muscles. Three varieties have been observed, so different in the circumstances of "their occurrences, as well as of their symptoms, progress, and results, as to merit "description. These are *cholera morbus*, *epidemic cholera*, and *cholera infantum*. "The present article is devoted specially to the first of these affections. It is the "variety so common as an endemic disease in various parts of the *United States* "during the summer season, and no doubt the same as that noticed by the ancient "authors, and described by Sydenham as occurring epidemically in England towards "the close of summer and beginning of autumn. By recent writers it is distinguished from the spasmodic variety by the name of *common* or *sporadic cholera*. " . . . . In persons of good constitution, the disease is very rarely fatal; it is "most apt to prove so in the very old, the feeble, and the intemperate."

† A summary of the portion of the report which relates to cholera is given in the volume of Transactions of the American Public Health Association for 1873. It appears to me desirable to put on record here certain portions of the original report.

in New Orleans, was 359. The distribution of the deaths in the several months of the year, arranged in three categories, is given in the following summary return :—

New Orleans, 1873.

	Cholera Sporadica.	Cholera Infantum.	Cholera Morbus.	Total.
January - - -	—	—	—	—
February - -	3	—	1	4
March - - -	4	2	8	14
April - - -	28	17	36	81
May - - -	97	50	39	186
June - - -	9	15	9	33
July - - -	—	16	3	19
August - - -	—	3	1	4
September - -	—	3	2	5
October - -	—	6	—	6
November - -	1	4	—	5
December - -	—	2	—	2
Total - -	142	118	99	359

Eighteen other deaths from "cholera" are included in the return of the special investigation made into the origin of the disease by the Board of Health.

The following extracts from the report give the particulars which I am wishful to place on record here :—

"Of the first 25 cases, the white numbered eleven (11), colored fourteen (14).

"The population of New Orleans is estimated at 200,000, of which one fourth belongs to the African race, or is of mingled blood, so that if the races had been equally affected, the proportion should have been, say 6 colored to 18 whites.

"The mortality, throughout the prevalence of cholera, was at the rate of 10 blacks to 13 whites.

"The negro race, as is well known, suffer more severely from cholera than the white races.

"The multiple cases of the cholera record are :

"No. 5, Margaret Woods,	535, Good Children Street	March 2nd.
„ 10, Isabella Woods,		„ 8th.
„ 17, William Brady,	S. B. Sabine - -	„ 30th.
„ 18, William Johnson,		„ 31st.
„ 19, Sarah Jackson,	146, Chartres Street -	„ 31st.
„ 20, Henrietta Jackson,		April 1st.
„ 34, Joseph Stratmeyer,	Gentilly Road - -	„ 12th.
„ 46, Mrs. Stratmeyer,		„ 15th.
„ 49, Francisco,	238, Julia Street - -	„ 16th.
„ 55, Francisco,		„ 17th.
„ 56, Antonio,		„ 18th.
„ 64, Collin,	10, Dumaine Street -	„ 22nd.
„ 68, Allain,		„ 24th.
„ 79, O'Brien, Julia,	308, Magazine Street -	„ 26th.
„ 79, O'Brien, John,		
„ 158, Mr. Bire (recovered),	Cor., Julia and Delta -	May 14th.
„ 159, Lizzie Bire (died),		
„ 191, Colored woman,	Insane Asylum - -	„ 20th.
„ 226, Joseph Dolun,		„ 28th.
„ 253, Charles Ploff,		June 21st.

(pp. 30-31.)

. . . . . "The total number of cholera deaths, in the first six months of 1873, is two hundred and forty-four (244).

"During the same period, the cholera infantum deaths amounted to 85.

"As the average cholera infantum death rate for the first six months of five successive years is about forty (40), it is probably just to attribute the increase of the mortality this year to cholera sporadica, and estimate the total mortality by this last-mentioned disease at about three hundred (300).

"The disease occurred in nearly all parts of the city; yet, as usual in cholera epidemics, those living in the densely populated and unclean parts of the city suffered most.

"No suspicion of the existence of cholera in New Orleans having been aroused, and it not being unusual for fatal cases of congestive intermittent to be furnished with certificates of death by cholera, or cholera morbus, the first six cases were not called to the attention of the Board.

"The seventh occurred at the Charity Hospital, and official notice was given of its existence. The history of antecedent cases was, therefore, immediately looked up, and every subsequent case visited without delay, and its history carefully ascertained.

"Some discussion having arisen since that time as to the question of importation, the ground has again been carefully gone over, and the particulars of the cases whose history has been furnished, when practicable, minutely ascertained.

"These enquiries, as previously stated, embraced all modes of infection and importation, as by visiting ships, the washing of clothing for persons connected with shipping, visiting of sailor boarding houses, contamination of drinking water, &c. &c. This remark applies, not only to the 25 cases whose history is given in full, but to every case recorded.

"The statement has been made in many newspapers, and some scientific journals, that cholera was introduced into New Orleans by vessels from foreign ports, attention being specially directed to those of the Black and Baltic Seas. Through incorrect information, some notoriety was given to the statement that Odessa was the source and origin of all the evil.

"Examination of the records of the arrival of vessels demonstrates that from October 1st, 1872, to June 1st, 1873, no vessel came to New Orleans from Odessa, or any point on either the Baltic or Black Seas, and that the only arrivals with passengers from European ports, from January 1st, 1873, to May 1st, 1873, were from Liverpool and Newport, England; Hamburg, Bremen, Palerma, and Marseilles.

"All sick emigrants in charge of the Emigration Bureau are sent to pay wards of Charity Hospital for treatment. Foreign sailors are sent to this institution, and to the Hotel Dieu. No case of cholera occurred among emigrants. Two seamen of the English ship "Belgravia" were attacked with cholera, the one April 14th, and recovered; the other April 16th, and died the 17th.

"The 'Belgravia' left England January 29th, passed quarantine April 4th; her crew had therefore been 10 days in New Orleans, and 75 days out from Liverpool, before the appearance of the disease. Thirty-seven cases of cholera had occurred in New Orleans previous to the sickness of these seamen.

"These are the only two cases of cholera that occurred among or near to the shipping, or that had any connexion with it.

"Referring to the question of the introduction of cholera from foreign ports into New Orleans, Dr. Howe, resident physician at the quarantine station, Mississippi River, makes the following statement:—

"'C. B. White, M.D., President Board of Health,

"'New Orleans, La. Office of Quarantine Physician, Mississippi

"'Dear Sir, River, July 21st, 1873.

"'Yours of July 18th, making inquiry as to whether or not any vessel had passed the station since January 1st, 1873, on which there existed cholera, or upon which cholera had existed during the voyage and prior to arrival here, is just at hand.

"'Since January 1st, 1873, there have passed and been personally examined 638 vessels of all kinds, and in no instance has there been cholera in any form. Nor has there been, as far as I could ascertain, any cholera during the passage of any vessel to this port. My information has been, in every instance, obtained from the master of the vessel, as well as from the medical officer when there was one on board. In some instances, when vessels have arrived from ports

where cholera was supposed to exist, I have required a sworn statement from the master, signed by himself, which is kept on file as additional evidence. And in no instance have I had reason to doubt the truth of any statement or sworn affidavit.

" ' Attached and forming a portion of this report will be found an official list of infected vessels arriving here since January 1st, 1873, as well as of vessels detained in quarantine, with full particulars concerning cause of detention, number of sick removed, with disease and result.

" ' Any further information will be given with pleasure, while

" ' I remain, very respectfully,

" ' (Signed) George Howe, M.D.

" ' Resident Physician, Quarantine Station,

" ' Mississippi River.'

" From the facts and statements furnished, it is evident that the epidemic is singularly free from even the suspicion of importation," (pp. 32–34).

" . . . . The first deaths of cholera or cholera morbus occurred February 9th and 10th. On the 7th the range of temperature was 24·5 deg. F.; on the 10th 19·51 deg. F. It will be recollected that Surgeon Vickery, in his account of the second case, thought the unusual depression of temperature had much to do with its fatal result.

" The third death of cholera occurred February 28th. On the 24th, 25th, and 26th the ranges of temperature were respectively 18 deg., 19 deg., and 17 deg.

" During the first 10 days of March, nine (9) deaths occurred, accompanied by very considerable daily oscillations of temperature, the mercury ranging on one day 18 deg., on another 20 deg., and on two days 20·5 deg.

" The months of March and April throughout present remarkable daily ranges of temperature.

" It seemed pretty evident that in many cases the exciting cause of the attack was sudden, and considerable change of temperature. . . . .

Table showing Variations of Temperature in New Orleans during the Six Months ending June 30th, 1873.

Month.	Daily Range, ° F.			No. of Days over 20° F.	No. of Days over 14° F.	No. of Days over 8° F.
	Highest.	Lowest.	Mean.			
January -	23·5	5·0	12·76	2 days.	10 days.	27 days.
February -	24·5	7·5	15·59	3 „	15 „	27 „
March -	37·0	7·5	16·17	7 „	19 „	29 „
April -	30·5	6·0	16·06	5 „	20 „	27 „
May -	21·0	9·0	14·29	1 „	14 „	31 „
June -	20·0	5·5	13·38	—	7 „	28 „
	—	—	14·66	18 days.	85 days.	169 days.

" April and May are the diarrhœa months of New Orleans. The attacks are seldom severe, and in most cases yield immediately to a very moderate dose of some mercurial, with or without opiates or astringents.

" This too is the cholera infantum period of the year in New Orleans. Our small mortality from that disease occurs almost entirely in the first half of the year.

" The comparative exemption of New Orleans is probably in a considerable degree attributable to the evenness of our summer temperature.

" The summer thermal lines given in the last report of the Board of Health of New Orleans afford an interesting comparison with those of the Board of Health of New York for the same period.

" In calling attention to rainfall, as exhibited in the chart farther on in the report [not printed with this extract], it is to be remembered that in

1873 April and May, meteorologically, seemed to have changed places. April is usually a showery month, and May almost unvaryingly pleasant; literally a month of sunshine.

" The chart shows April of 1873 very dry, and May a month of heavy and repeated rainfalls. In New Orleans one half inch of rainfall is only an ordinary shower, whose effect immediately disappears, unless it has been preceded by others.

" With the high, cool, and dry winds prevailing, the whole city, during the month of April, was enveloped in clouds of dust [which appears to be particularly foul from decomposing organic matter].

" Several days entirely without fall of rain preceded the appearance of the first cases of cholera in February, and again preceded the first cases in March.

" There is a general coincidence between the occurrence of cholera cases and the lack of rainfall, which is more noticeable by the table of cases than on the chart, as lines of the latter are drawn to show deaths by weeks.

" New Orleans should be free from contagion of drinking water by cholera poison, as usually caused, because of its water supply.

" The larger portion of its inhabitants drink rain-water from cisterns, which are invariably above ground. The remainder drink hydrant water from the Mississippi. Water from wells is never used for cooking or drinking." (pp. 36–39). . . . . " Of the first 80 deaths, 46 received certificates of death by cholera morbus.

" Even at this time [December 1873] the opinion of the physicians of New Orleans is divided upon the subject.

" Medical men connected with hospitals, seeing few save fatal cases, unhesitatingly pronounce the disease Asiatic cholera.

" A large portion of New Orleans physicians consider it not to have been Asiatic cholera; all, however, agreeing that in fatal cases no distinction can be drawn between the cholera sporadica of 1873, at New Orleans, and genuine Asiatic cholera.

" The few holding that when no distinction exists there is no difference, unhesitatingly pronounce the disease Asiatic cholera, and suggest that importation is not necessary, that the germs of that disease are always and everywhere present, only awaiting favorable circumstances to multiply and produce the effects customarily experienced from the general and abundant presence of cholera poison.

" Most physicians, however, although admitting the difficulty of differential diagnosis in fatal cases, consider that the character of the disease, its course and progress as a whole, warrant the belief that it was not Asiatic cholera.

" Some of the considerations influencing them to such belief are :—

" 1. The non-importation of the disease.

" 2. That no evidence of portability or infection was exhibited in the city, where every facility existed for ascertaining its natural history.

" 3. The appearance of the disease at many localities remote from each other, and from anything that could be considered a common cause, and in all parts of the city, at dates synchronous or nearly so.

" 4. The small mortality of those attacked with vomiting and purging during the presence of the disease, attacks similar to which, during the presence of former epidemics, have customarily proved the beginning of that usually fatal disorder.

" The death-rate of persons thus attacked is variously estimated at from 3 to 12 per cent..

" 5. The fact that so general diffusion of the disease existed without resulting in a great epidemic.

" Had the disease possessed the portability and infectiveness attributed to Asiatic cholera, its course and results would have been the reverse of the actual occurrences.

" 6. The fact of the long-continued presence of the disease in New Orleans, without flaming up to epidemic proportions, shows absence of the peculiar characteristics of Asiatic cholera, as generally admitted.

" The disorder seemed endemic, not epidemic.

" 7. Cholera occurred at the season of the year when intestinal disorders appear in New Orleans, April being the diarrhœa month of the year.

" The city's small mortality of cholera infantum occurs also in the first half of the year.

" The prevalence of cholera at the same period of 1873, may be viewed as the natural tendency of that portion of the year, exaggerated into serious and deadly, and somewhat general disease, by the presence of local poison, engendered by filth and magnified by unusual meteorological conditions.

" 8. The amenability to treatment of what were in appearance serious cases.

" Under the hypodermic use of morphine and atropia, or morphine alone, immediate relief and ultimate recovery was the rule; under treatment by calomel and quinine, recovery also seemed speedy; also, under domestic remedies, many cases were restored to health.

" A large number of persons were taken ill with profuse vomiting and purging, sometimes preceded by faintings and cramps, with great subsequent weakness, who recovered without any aid whatever, save the vis medicatrix naturæ.

" 9. The small number of multiple cases is considered an evidence of its non-infective or epidemic character.

" 10. The disease was not carried to our neighbours.

" With Mobile, constant intercourse continued at the rate of two passenger trains per day, each way, with numerous freight trains, and to the hamlets along the Mississippi Sound, three trains per day each way.

" Neither in these small villages nor in Mobile did cholera occur." (pp. 42–44.)

A copy of the report called for by Congress, on the cholera epidemic of 1873, in the United States, reached me as the present report was about to go to press.* This report forms a large octavo volume, and it is divided into two parts, each paged separately. The first part, of 28 pages, contains a report by Dr. John M. Woodworth, supervising surgeon, U.S. (merchant), Marine Hospital Service, on "The Introduction of Epidemic Cholera through the Agency of the Mercantile Marine: Suggestions of Measures of Prevention." The second part, of 1,025 pages, contains a series of three reports, namely, (A). *A history of the Cholera Epidemic of* 1873 *in the United States*, by Dr. Ely McClellan, assistant surgeon, U.S.A.; (B.) A *History of the Travels of Asiatic Cholera* (including much matter respecting previous epidemics of cholera in the United States), by Dr. John C. Peters, of New York City, and Dr. Ely McClellan; and (C.) *A Bibliography of Cholera*, by Dr. John S. Billings, assistant surgeon, U.S.A.

Dr. McClellan, in his account of the clinical history of the epidemic of 1873, expresses himself as fully satisfied that the disease was *malignant epidemic cholera*. The further inquiry as to the beginning of the epidemic in New Orleans was carried out by assistant surgeon Van Buren Hubbard, U.S.A. The following are extracts from his report of the results of this investigation, dated January 30th, 1874.

Referring to Dr. George Howe's letter, printed above, Dr. Van Buren Hubbard observes:—

" The tone of this extract is positive, and the evidence seemingly conclusive. Desiring, however, additional facts, upon August 5th, 1874, we addressed a letter to the quarantine physician of the Mississippi station, from which letter we make the following extracts:—

" I. Will you inform me if, during the months of December 1872, and January and February 1873, the quarantine upon the Mississippi river was rigidly enforced?

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* War Department, Surgeon-General's Office. *Cholera Epidemic of* 1873 *in the United States.* Washington, Government Printing Office, 1875.

"II. If during the months named any vessel from supposed infected ports (in original letter, ports were enumerated) arrived at the quarantine station upon the Mississippi river?

"III. If vessels from any of the ports named arrived at the Mississippi quarantine station, I would respectfully ask information as to the character of the inspection to which they were subjected."

"In answer to these questions, we received from Dr. A. W. Perry, late quarantine physician of the Mississippi river station, a communication dated August 21st, 1874, of which the following is extracted: "*Quarantine in the months you refer to was confined to asking each captain the questions I here enclose.*" We reproduce the list of questions:—

Number of permit?
Date?
Name of tow-boat?
Kind of vessel?
Name?
Name of master?
Name of pilot?
Where from?
Number of crew?
Kind of cargo?
Number of passengers, foreign?
Number of passengers, domestic?
Where are passengers from?
Any sickness while out?
What kind?
Any deaths?
What cause?
Are all well now?
Have you a bill of health?
Number of days out?

"The letter of Dr. Perry further contains a list of 175 vessels that arrived at New Orleans during the three months named, bringing into that port from the localities before alluded to 1,844 passengers and 3,500 of crew, a total of 5,344 individuals, the majority of whom were from localities suspected of cholera.

"From an examination of the monthly reports of the Mississippi Quarantine Station, which were furnished through the kindness of the president of the Board of Health, the following tables have been prepared:

"I. A tabular statement of the number of vessels, with the number of passengers and the number of crew, that arrived at the port of New Orleans, La., during the month of December 1872, and the first six months of 1873.

Month.	Number of Vessels.	Number of Passengers.	Number of Crew.
December 1872 - - -	150	2,204	2,684
January 1873 - - -	134	1,169	2,667
February 1873 - - -	100	550	1,884
March 1873 - - -	118	726	2,254
April 1873 - - -	121	804	2,285
May 1873 - - -	86	708	1,592
June 1873 - - -	60	406	1,365
Total - - -	769	5,163	14,731

A grand total of 15,294 individuals.

" II. A tabular statement of the number of vessels, with the number of passengers and the number of the crew, that arrived at the port of New Orleans, La., during the month of December 1872, and the first six months of 1873, from European, West Indian, and South American ports.

Month.	Number of Vesssels.	Number of Passengers.	Number of Crew.
December 1872 - - -	68	1,407	1,145
January 1873 - - -	53	820	1,523
February 1873 - - -	41	278	823
March 1873 - - -	65	453	1,187
April 1873 - - -	57	491	1,240
May 1873 - - -	31	481	669
June 1873 - - -	27	329	662
Total - - -	342	4,249	7,249

A grand total of 11,498 individuals.

" Following further this line of investigation, from the Annual Report of the Commissioners of Emigration for the State of Louisiana, we quote the following:

Statistics of Immigration.

" The number of foreign immigrants arrived at the port of New Orleans during the year ending December 31, 1873, is as follows:

From Bremen - - - - - - -	2,938
From Hamburg - - - - - - -	576
From Liverpool - - - - - - -	1,834
From Bordeaux - - - - - - -	151
From Havre - - - - - - - -	239
From Marseilles - - - - - - -	6
From Palermo - - - - - - -	121
From Messina - - - - - - -	3
From Genoa - - - - - - - -	1
From West Indian and South American ports - -	210
Total - - - - - -	6,079

" 5,687 arrived in steamships, and 392 in sailing vessels. (pp. 106–108.)" . . .

" . . . . Of this number (6,079) 4,122 were males, 1,957 were females.

Through the kindness of Mr. H. Von Werthen, the agent of the emigration bureau, we obtained much valuable information as to the emigrants who arrive at the port of New Orleans, and from the facts thus obtained we are able to present the following table:

" A tabular statement as to the number of emigrants who arrived at the port of New Orleans, La., during the month of December 1872, and the first six months of 1873, with the port from which they sailed for the United States.

Port of Departure.	December.	January.	February.	March.	April.	May.	June.	Total.
Liverpool - - -	467	424	65	190	112	94	244	1,596
Hamburg - - -	491	—	—	91	109	—	—	681
Bremen - - -	417	169	153	53	224	345	—	1,361
Barcelona - - -	2	—	—	—	—	—	—	2
Marseilles - - -	3	—	—	—	—	—	—	3
Bordeaux - - -	11	—	—	—	—	3	—	14
Havana - - -	8	3	15	18	8	11	9	72
Vera Cruz - - -	—	—	3	26	—	32	—	61
Palermo - - -	—	—	—	114	6	—	2	122
Totals - -	1,399	596	236	482	459	485	255	3,912

" Prior to the outbreak of cholera at New Orleans, it was an ascertained fact that cholera was upon its westward march, and that the disease had already, in one instance at least, reached the shores of North America. On the 6th November 1871, the steamship "Franklyn," from Stettin, arrived at Halifax, having had an outbreak of cholera on the voyage. Two men from the shore who were employed, after her arrival, on this steamer, were taken with cholera.

" One died of the disease at his home in Halifax, the other man, after he became sick, went to his home at Chezzetcook, a small fishing-village twenty-two miles south-east of Halifax, and there died. At Chezzetcook four other cases occurred in the family of this man (Lepiere) two of which were fatal.

" The most efficient sanitary precautions were at once adopted at Halifax, and no other cases occurred. After it was known that the disease had been carried to Chezzetcook, the Government adopted stringent sanitary measures, and at once checked the spread of the disease.

" During the series of inspections instituted at New Orleans during 1874, it was several times intimated to us, by sanitary observers, that cholera existed in the West Indies during the late months of 1872, but that the fact of its existence had been suppressed. We have most carefully investigated this matter, without, however, obtaining any very definite results. The only clue that could be found was obtained through the supervising surgeons of the marine hospital service, who furnishes us with a letter of the honorable the Secretary of State, from which the following extract is made :—

" Under date of September 23, 1872, the consul at Kingston, Jamaica, reports the arrival of a coolie ship at Bluff's Bay in that island, and that one case of cholera had occurred since the arrival, resulting in the death of one of the coolies. It was reported also that some sixty of the coolies died on the passage, but the disease was not ascertained by the consul.

" The list of the vessels that arrived at the port of New Orleans during January, 1873, shows that direct communication was established between that city and Jamaica and the adjacent islands. January 21, 1873, the schooner "Mai" arrived from Port Antonio. January 24, 1873, the schooner "Challenger" arrived from Grand Cayman.

" The facts which have thus far been obtained go to prove :—

" I. That prior to the outbreak of cholera at New Orleans, in 1873, a coolie ship infected with the disease had arrived at Jamaica; and that after her arrival at least one cholera death had occurred on that island.

" II. That at the Mississippi river quarantine, during the last month of 1872, and the early months of 1873, the only inspection to which vessels arriving at that station were subjected, consisted in receiving as final the answers which the officers of vessels saw fit to make to an imperfect list of questions.

" III. That during the months named a large number of emigrants arrived at the city of New Orleans from cholera-infected districts.

Upon pushing the investigation further, we are informed that the Commissioners of Emigration exercise no control over emigrants who arrive at the port

of New Orleans, other than of an advisory nature. That the effects of emigrants are inspected upon ship-board by a customs' officer, and that upon landing the emigrant follows unmolested his personal inclinations. That the large majority of the emigrants who arrived at the port of New Orleans, in the month of December, 1872, went at once to the state of Texas, but that during the succeeding months large numbers passed into the interior of the United States by the Mississippi river route. Emigrants for Texas are usually shipped direct by the Morgan line. The depôt of this company joins the ship and the steamboat levee; and individuals availing themselves of this route are seldom detained over night at New Orleans.

" Emigrants who desire to pass northward by the Mississippi river remain sometimes for days in the city, *and lodge at emigrant boarding-houses, which face the river upon the steamboat levee. It is an ascertained fact that during the months of January, February, and March many of these houses were filled with individuals of this class.*

" We have, therefore, traced individuals from cholera-infected districts of Europe directly to that locality of the city of New Orleans at which the report, of the Board of Health states the earlier cases of the disease became infected.

" The evidence, although circumstantial, is certainly strong that the unfortunate individuals who contracted cholera upon or near the steamboat levee came in contact with the poison which had been imported in the effects of emigrants from the cholera-infected districts of Europe, from which infected districts it is shown that emigrants did arrive prior to the occurrence of the initial case in the city of New Orleans. This is certainly more reasonable, more in accordance with history, than it is to suppose that a *de novo* development of Asiatic or epidemic cholera occurred at the beautiful crescent city.

" The doctrine of " non-importation " will not stand.

" We fully admit that by the board of health, whose officials were earnest in the endeavour to discover the arrival of individuals who might be infected with cholera, every effort was made to develope the facts attending the introduction of the disease. We have with the greatest care gone over the ground which had been previously investigated by the President of the Board of Health, and have been able to determine three additional facts :

" I. The arrival of a cholera-infected ship at Jamaica in September 1872, and the fact that at least one case of the disease occurred upon that island after the arrival of the ship.

" II. The utterly worthless and unreliable quarantine which was maintained at the Mississippi river station during December 1872 and January and February 1873. It must be remembered that this station is on the Mississippi river, at a very considerable distrance below the city of New Orleans, and therefore far removed from the direct control of the Board of Health.

" III. The arrival of emigrants from cholera districts, and the location of such emigrants at the very point in the city of New Orleans at which the early cases of the disease occurred.

" It is submitted that these facts destroy utterly the theory of the original development of cholera in 1873 in the United States." (pp. 109–111.)

Note D.

Note on Cholera in East Africa, 1870–71.

Since the completion of this Report, Dr. Christie has favoured me with the following note, containing additional information relating to the progress of Cholera in East Africa in 1870–71 :—

Cholera appeared at Mozambique, as previously stated, on May 6th, 1870, and, according to native report, the tract of the epidemic was from the interior of Africa. This is exceedingly probable for at that time there was no report of the disease on the coast further south than Cape Delgado, and it would be impossible, in the month of May, for any native craft, or even square-rigged vessel, to make Mozambique from the north against the S.W. monsoon. The probability is that it reached Mozambique from the south of Tanganyika by

means of the Wabisa, who are the middle men of the inland traffic. Mozambique infected Majunga, on the north-west of Madagascar, in the month of August 1870, and the island of Johanna on the 16th August, doubtless by means of slave dhows in both cases.

"At Majunga the mortality was very great and two Bahoras, natives of India, died. To what extent the disease spread in the interior I am not aware. Nossi Bey was infected by Majunga in September 1870, and a second time in March 1871.

"In Johanna the disease continued from 16th August till October, and the island was infected a *second* time on December 14th, but this time the disease was conveyed from Nossi Bey, and it continued in Johanna till the 2nd January, 1871. There were 378 deaths. The disease was principally confined to the town. All communications between the town and the sugar estates of the Sultan and Mr. Sunley was stopped, and there were no deaths there. Dr. Morton of H.M.S. 'Wolverine' collected for me the facts regarding Johanna shortly after the close of the epidemic, when the 'Wolverine' visited the island.

"Mozambique infected Ibo on the 11th January 1871, and Quilimane in February of the same year. The facts regarding Ibo are as previously narrated. At Quilimane the mortality was very great, and amongst the natives it was estimated that from four to five thousand died, and the disease was still there at the end of May 1871. At the time there was a large force in readiness to proceed up the Zambezi against the rebel chief Bonga, but one third having perished from cholera the expedition for the time had to be abandoned. The disease passed into the interior and further trace of it was lost. The progress of the disease from Zanzibar to the northern ports may be shortly stated. The dhows for the north began to leave early in April 1870, and every harbour in communication with Zanzibar was infected as far north as Socotra.

"Mr. Heale sailed from Zanzibar for Brava in a dhow on the 16th April. On the second day after the dhow reached Brava the disease appeared there, and continued for two months. It was reported that half the population perished. Mr. Heales' estimate of the deaths among the Somalis was 200, but the mortality was great among the negroes. The dhow passed on to Aden, carrying letters for Zanzibar which were received at that place on July the 18th.

"It is possible that the disease may have been carried to Makalla or the Persian Gulf, crossing the tract of the epidemic, in May 1870, which entered Africa in November 1864. Socotra, the last place to the north where further trace of it is lost, cannot be far from the line of the track of entrance, five and a half years before."

MAP
TO ILLUSTRATE
CERTAIN SECTIONS OF
Mr Netten Radcliffe's
REPORT ON CHOLERA,
1864-73.

ENGLISH MILES.
100 0 500 1000 1500

RUSSIAN EMPIRE
BLACK SEA
CAUCASIA
CASPIAN SEA
ARAL SEA
KHIVA
BUKHARA
KOKAN
TURKEY IN ASIA
MEDITERRANEAN SEA
EGYPT
PERSIA
EL HEDJAZ
ARABIA
RED SEA
NUBIA
ABYSSINIA
EL YEMEN
HADRAMAUT
GULF of ADEN
ARABIAN SEA
SOMALI
GULF of OMAN
OMAN
PERSIAN GULF
BELUCHISTAN
MAKRAN
AFGHANISTAN
PUNJAB
NORTH WEST PROVINCES
BENGAL PRESIDENCY
LOWER PROVINCES
CENTRAL PROVINCES
BOMBAY PRESIDENCY
HINDOSTAN
MADRAS PRESIDENCY
CEYLON

Odessa, Athens, Constantinople, Aleppo, Beyrout, Damascus, Alexandria, Cairo, Jerusalem, Urumiah, Tabriz, Khiva, Tashkend, Bokhara, Samarcand, Astrabad, Teheran, Meshed, Baghdad, Kerbella, Hillah, Nedjef, Bassra, Ispahan, Yezd, Herat, Balkh, Hindux, Cabul, Hail, Kuweit, Yembo, Medina, Ameyzeh, Shiraz, Bushire, Bahrein, Alsalvo, Kerman, Khatif, Riad, Jidda, Mecca, Bundar Abbas, Gonfodah, Loheia, Sana, Hodeida, Mocha, Aden, Makalla, Maskat, Berberah, Cape Guardafui, Socotra, Magadoxo, Brava, Bombay, Calcutta, Madras, Aleppy

Dangerfield, Lith, 22, Bedford St. Covent Garden.

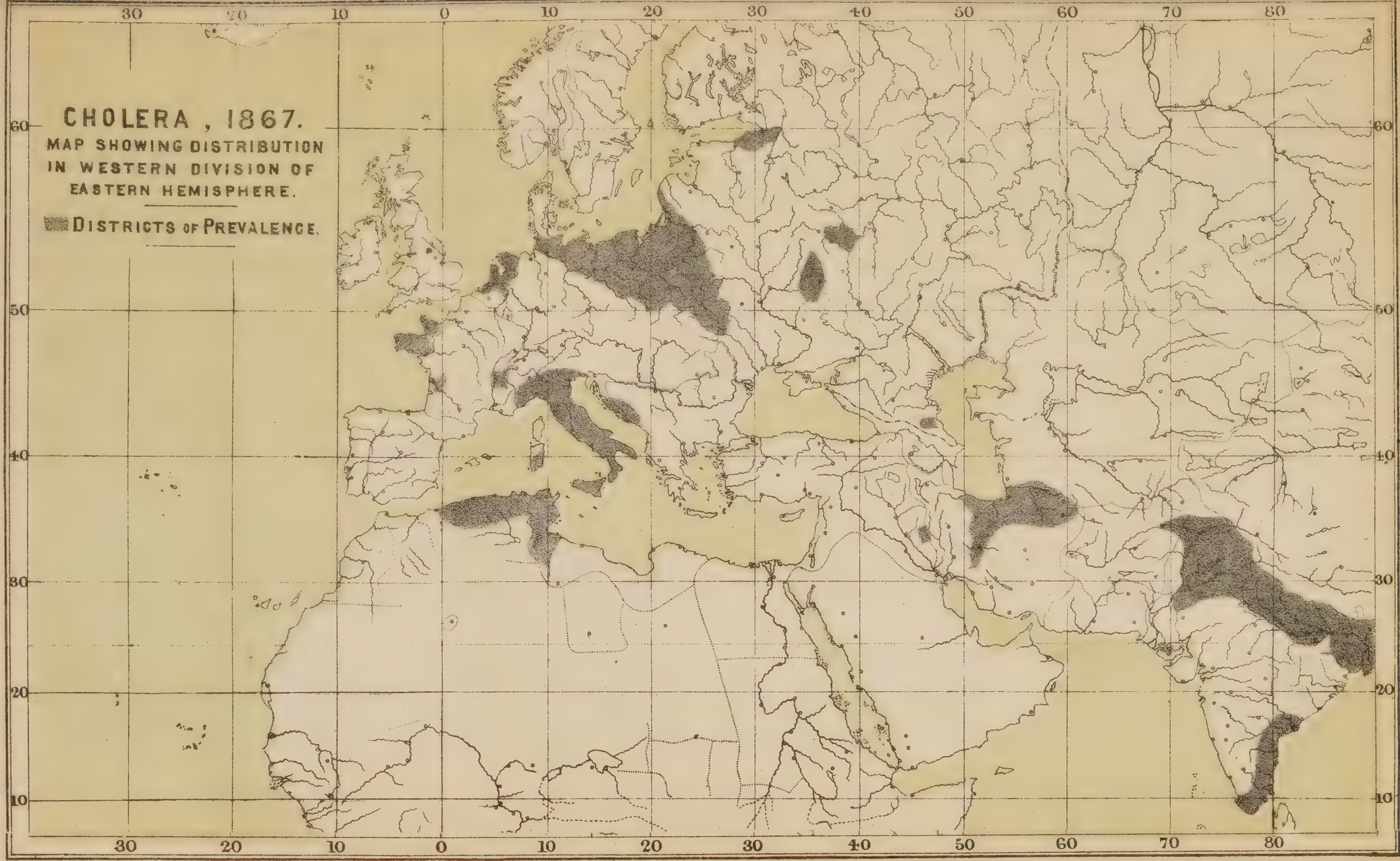
CHOLERA, 1864-65.

MAP SHOWING DISTRIBUTION IN WESTERN DIVISION OF EASTERN HEMISPHERE.

DISTRICTS OF PREVALENCE.

Dangerfield, Lith., 22, Bedford St. Covent Garden

CHOLERA, 1866.
MAP SHOWING DISTRIBUTION IN WESTERN DIVISION OF EASTERN HEMISPHERE.
DISTRICTS OF PREVALENCE.
30
20
10
0
10
20
30
40
50
60
70
80
60
50
40
30
20
10

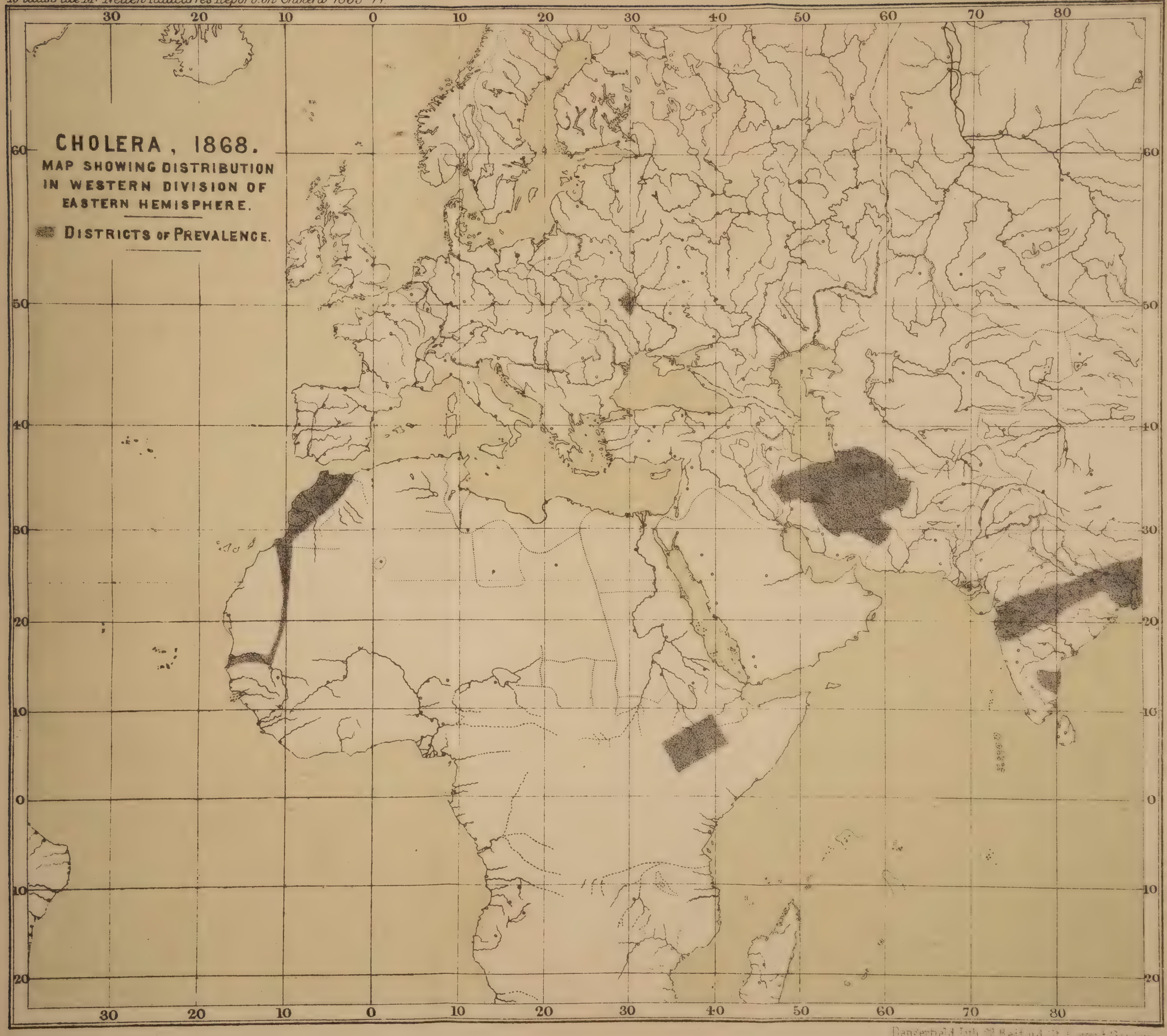


Dangerfield, Lith. 22, Bedford St. Covent Garden.

CHOLERA, 1868.

MAP SHOWING DISTRIBUTION IN WESTERN DIVISION OF EASTERN HEMISPHERE.

DISTRICTS OF PREVALENCE.



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CHOLERA, 1869.

MAP SHOWING DISTRIBUTION IN WESTERN DIVISION OF EASTERN HEMISPHERE.

DISTRICTS OF PREVALENCE.

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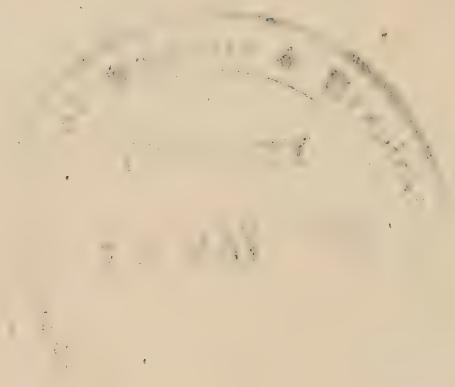

CHOLERA, 1870.

MAP SHOWING DISTRIBUTION IN WESTERN DIVISION OF EASTERN HEMISPHERE.

DISTRICTS OF PREVALENCE.

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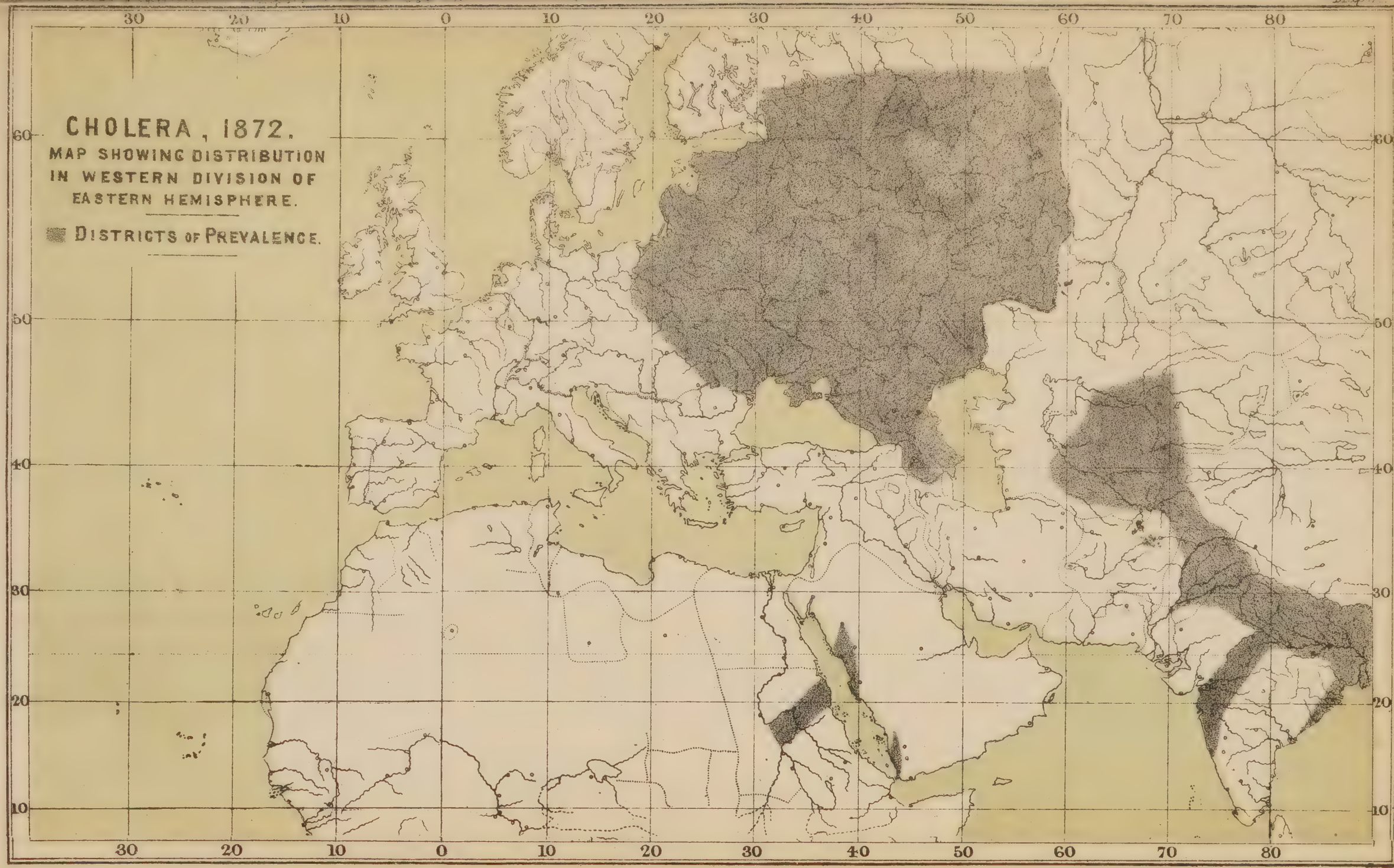
CHOLERA, 1871.

MAP SHOWING DISTRIBUTION IN WESTERN DIVISION OF EASTERN HEMISPHERE.

DISTRICTS OF PREVALENCE.

Dangerfield, Lith, 22, Bedford St. Covent Garden.

18 MAY 12

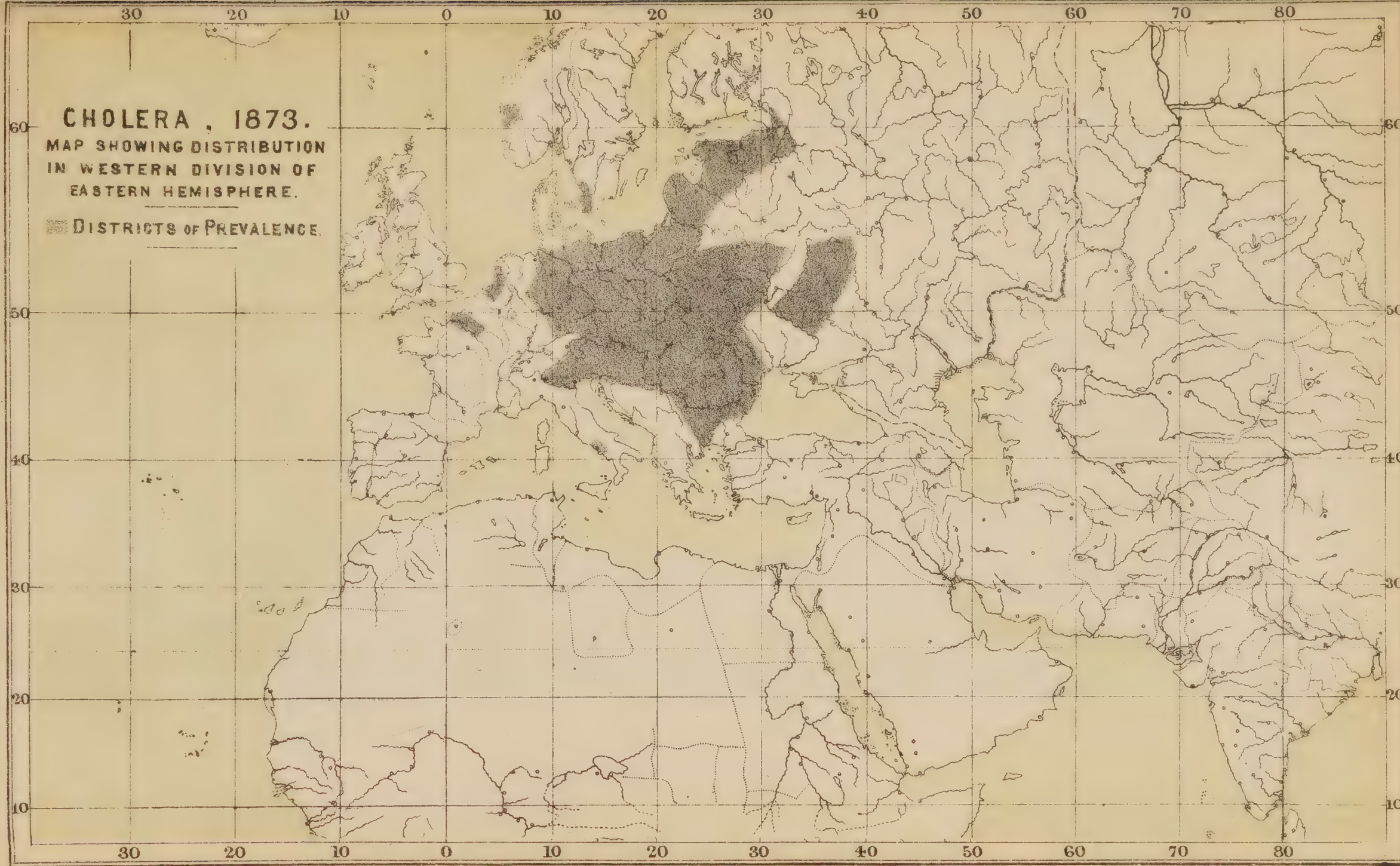

CHOLERA, 1872.
MAP SHOWING DISTRIBUTION IN WESTERN DIVISION OF EASTERN HEMISPHERE.
DISTRICTS OF PREVALENCE.
30 20 10 0 10 20 30 40 50 60 70 80
60 50 40 30 20 10

Dangerfield, Lith. 22, Bedford St. Covent Garden.

CHOLERA, 1873.

MAP SHOWING DISTRIBUTION IN WESTERN DIVISION OF EASTERN HEMISPHERE.

DISTRICTS OF PREVALENCE.



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No. 2.—Abstract by Dr. Seaton of Proceedings of the International Sanitary Conference held at Vienna, July 1 to Aug. 1, 1874.

The International Sanitary Conference of Vienna, to which I had the honour of being delegated, along with Dr. Dickson of Constantinople, as representing the United Kingdom, was assembled at the instance of the Austro-Hungarian Government for objects which are stated at length in the dispatch of Count Andrássy, appended to this paper (Annex I.). Summarily, these objects were (1) to re-examine the state of our knowledge of cholera in reference to prophylaxy, with the view of establishing, if possible, a complete understanding between the Governments who had been convoked as to the national and international measures to be adopted for preventing the spread of that disease, "de concerter entre les États "intéressés des arrangements obligatoires qui auraient pour but "d'amener une parfaite conformité dans les dispositions à prendre pour "se prémunir contre ce danger commun;" and (2) to consider the question of instituting a permanent, or temporary, international sanitary commission for the further investigation of epidemics and the means of combatting them. It was reserved for the Conference to enter or not, as it might see fit, on the subject of quarantine against other diseases than cholera.

Every European State was represented at this Conference. Persia and Egypt were also represented. The United States of America had been invited by the Austro-Hungarian Government, and had accepted the invitation, but no representatives attended. The States represented were 22 in number,* each sending as many delegates as it thought fit, but each disposing of one vote only. The delegates were, with few exceptions, of the medical profession, and no State was without a medical representative. Most of the delegates were persons holding office in the public service, sanitary or medical, of their respective countries.

The Conference was formally opened July 1st, 1874, and formally closed August 1st, 1874. During this time 20 sittings of the full Conference were held, independent of the meetings of the several committees to which had been entrusted the preliminary consideration, and preparation for discussion, of some of the more important questions on which the Conference had to decide.

Following the programme which had been proposed and submitted to the respective Governments in Count Andrássy's despatch (Annex II.) certain preliminary scientific questions in reference to cholera were first submitted for consideration. These the Conference decided to consider in full assembly without the intermedium of committees. As most (though not all) of these questions had been thoroughly discussed by the Conference which had been held eight years previously at Constantinople, it was determined, in order to facilitate business, that as each such question arose the conclusions arrived at on the subject by the Constantinople Conference should be read, and a provisional vote thereon taken without discussion. If the result were one of unanimous assent, the question was regarded as settled in that sense, and the Conference passed on to the next question. But if the assent were not unanimous, if a single delegation of those present at the particular time even abstained from voting, the discussion was declared open. This mode of proceeding was found in practice extremely convenient and led to a great saving of time.

* Austria, Hungary, Belgium, Denmark, Egypt, France, Germany, Great Britain, Greece, Holland, Italy, Luxembourg, Norway, Persia, Portugal, Roumania, Russia, Servia, Spain, Sweden, Switzerland, Turkey.

I.—Scientific Questions.

The first of the preliminary questions was as follows :—"Le choléra "Asiatique, susceptible de s'étendre (épidémique), ne se développe-t-il "spontanément que dans l'Inde, et est-ce toujours du dehors qu'il "arrive quand il éclate dans d'autres pays? Ou bien revêt-il aussi le "caractère endémique dans d'autres pays que l'Inde? dans ce cas, quels "sont ces pays ?"

On the points involved in this question the Conference was in unanimous agreement with that of Constantinople, that epidemic cholera has its origin in India, and exists permanently there in an endemic state; that it is probably endemic *only* in India, though there are some countries bordering on India, concerning which sufficient grounds do not exist for a formal conclusion on this point; that it has never been observed in a really endemic state, (which of course must be carefully distinguished from an origin from secondary foci) either in any part of Europe, or in Turkey in Asia, or in the Caucasus, or in the north of Africa, or in America; and that, though the possibility of its becoming acclimatized in any of those countries is not to be rejected, such event is to be held as extremely problematical.*

On the second question, "Le choléra est-il transmissible par l'homme ?" some discussion took place, not in reference to the main question, in which the Conference was entirely in accord with that of Constantinople, but on an exception taken by the German delegates to the wording of one of the conclusions of the Constantinople Conference on the subject.† With certain qualifications to meet this view, and which recognised the influence of localities, the Conference accepted those conclusions, thereby affirming that cholera is transmissible by the human subject coming from an infected locality; that the rapidity of its transmission is in correspondence with the activity and rapidity of human communications; that the introduction of a single cholera patient may give rise to the development of an epidemic; and that there are facts which tend to prove that a single individual (and *à fortiori* several) coming from an infected place, and affected with diarrhœa only, may be enough to give rise to the development of an epidemic of cholera, or, in other words, that the premonitory diarrhœa of cholera may be the means of transmitting the disease.‡

On the points raised in the third question, "Le choléra peut il être

---

* Throughout this abstract I have given *in full* the conclusions as voted by the Conference. They frequently go beyond a mere categorical reply to the questions asked, and sometimes contain qualifications of the conclusions stated in the final "Relevé des Conclusions, &c." (Annex. III.) which should not be disregarded.

† The phrase objected to was "L'homme atteint de choléra est par lui-même le "principal agent propagateur de cette maladie." And the objection taken by Professor Pettenkofer was particularly to the words "par lui même." The view of the German delegation was thus formulated by Professor Hirsch :—"Je ne conteste "nullement la transmissibilitée du choléra par l'homme venant d'un milieu infecté; "je considère l'homme seulement comme la cause spécifique, en dehors de l'influence "de la localité infecté; en outre, je le considère comme le propagateur du choléra, "lorsqu'il vient d'un endroit où le germe de la maladie existe déjà."

‡ It is apparently by an error, which escaped observation at the time, in the Procès-verbaux, that the proposal of the German delegation is therein stated to have been formally adopted, and to the exclusion of the Constantinople resolutions. But the fact was that the discussion showed that there was nothing really to dispute about; the conference readily and at once recognized the influence of localities, and most certainly the resolutions of Constantinople, modified on this point only, as I have stated in the text, were adopted. I find this error in the Procès-verbaux and Relevé des Conclusions, has been since noticed by other Members of the Conference. (See Bull. de l'Acad. de Med. 1874, p. 926.)

" propagé par des effets qui, provenant d'un lieu infecté, ont servi à " l'usage, et spécialement par ceux qui ont appartenu à des cholériques ?" the conclusions of the Constantinople Conference were unanimously accepted, viz., that cholera is transmissible by goods employed for personal use coming from an infected place, and especially by such as have been used by cholera patients; and that there are even facts which show that the disease may be conveyed to a distance by such goods, if they have been kept close and unexposed to free circulation of air.

The fourth question, " Le choléra peut-il-être propagé par des comestibles ? " was one which had not been considered at Constantinople. This question it was decided after a short discussion to divide into two, the one having reference to food, and the other to drink, especially to drinkable water. To the first branch of the question, " Le choléra peut-" il-être propagé par les aliments ? " the answer given by a majority, after considerable discussion, was that the Conference having no conclusive facts of the transmission of cholera by food, was not in a position to give a formal decision on the point. To the second division of the question, " Le choléra peut-il-être propagé par des boissons, particulière-" ment par l'eau ? " the reply was unanimously in the affirmative.

On the fifth question, " Peut-il-être importé par des animaux vivants?" the conclusion arrived at by a majority, after some discussion, was that there exists no proof of the transmission of cholera from animals to mankind, but that the possibility of it may reasonably be admitted.

On the sixth question, " Le choléra peut-il-être importé par les " marchandises ? " the conclusion of the Conference at Constantinople, that, while they were unanimous as to the absence of any proof of the transmission of cholera by merchandise, they must admit the possibility of such occurrence under certain conditions, was, after discussion, adopted by a majority. No vote was given against it, but several delegations abstained from voting. As is evident from the wording of the resolution, it was only as to the concluding phrase that there was any difference of opinion.

On the seventh question, " Le choléra peut-il-être propagé par les " cadavres des cholériques ? " the conclusion of the former Conference, that though there was no conclusive evidence of the transmission of cholera by the corpses of cholera patients, it was prudent to consider them as dangerous, was unanimously adopted.

On the eighth question, " Le choléra peut-il se propager au loin par " l'atmosphère seule ? " the Conference adopted, with equal unanimity, the conclusions of that of Constantinople, which were as follows: No fact up to the present time has shown that cholera can be propagated to a distance by the atmosphere alone, whatever the atmospheric conditions may be; and it is further a law, without exception, that no epidemic of cholera has ever been propagated from one point to another in a shorter time than was requisite for a human being to travel from the one point to the other. The surrounding air is the chief vehicle of the cholera-producing agent, but the transmission of the disease by the air is limited, in the immense majority of cases, to a distance very close to the source of infection. None of the facts which have been cited of transport of cholera by the atmosphere to the distance of one or of several miles is sufficiently conclusive.

The Conference assented also with unanimity to the answer which had been given at Constantinople to the ninth question, viz. " L'air frais " arrivant du dehors aux agents donnant naissance ou propageant le " choléra, et les aërant, ou bien l'isolement de ces agents de l'air extérieur, " constituent-ils des éléments ayant ou non une influence sur le caractère " contagieux du choléra ? " This reply was to the effect that in fresh air

the generative principle of cholera rapidly loses its morbific activity, but that under special conditions of confinement of air such activity might be preserved for an undetermined time: that it was under these conditions of confinement of air that, (as already stated in reply to question 3), cholera might be transmitted even to a distance by goods employed for personal use; that great deserts were a very efficacious barrier against the propagation of cholera, and that there was no example of that disease having ever been imported either into Egypt or Syria across the desert by caravans coming from Mecca.

The two remaining preliminary questions of the programme gave rise to long and animated discussions.

Question 10 was, "Quand il y a contagion, quelle est la durée de "l'incubation?" The resolutions of the Constantinople Conference on this point had been as follows:—"In almost all cases, the period of "incubation, *i.e.*, the time which elapses between the moment at which "the individual receives the cholera infection and the commencement of "the premonitory diarrhœa, or of the confirmed cholera, does not exceed "a few days [elsewhere more precisely limited by the words, 'a week "at the outside.'] All facts which have been cited of a longer "incubation relate to cases which are inconclusive, either because the "premonitory diarrhœa has been included in the period of incubation, "or because the infection might have taken place after the person's "departure from the infected locality. Observation shows that the "duration of the choleraic diarrhœa which has been termed premonitory, "(which must not be confounded with every diarrhœa met with at "cholera times), does not exceed a few days. The facts which have "been cited as exceptional do not prove that the cases of diarrhœa "prolonged beyond this period are really choleraic, and are susceptible "of transmitting cholera when the individual suffering has been with-"drawn from all sources of infection." After a very long debate, the Conference of Vienna assented to these conclusions by 13 affirmative votes to 1 negative, four delegations abstaining from voting.*

The 11th and last question was this:—"Connâit-on des moyens ou des "procédés de désinfection grâce auxquels le principe générateur ou con-"tagieux du choléra peut sûrement ou avec quelque chance de succès être "détruit ou perdre de son intensité? Dans le cas affirmatif, quels sont "ces moyens?" A short preliminary discussion made it evident that it would be desirable to take separately the opinion of the Conference as to the existence of means of disinfection which might be relied on with certainty, or only of means for the probable success of which there was good evidence; to separate, in short, the "sûrement" from the "quelque chance de succès." The known existence of any means of disinfection, absolutely certain in its operation, was denied by 12 delegations, and affirmed by none, seven delegations abstaining from voting.

* The difference of opinion, at least between the delegations which voted in the affirmative and those which abstained from voting, was, I apprehend, more apparent than real. I did not gather from the discussion that it was at all disputed by the latter that in the immense majority of cases (perhaps the expression "almost all" might have been felt by them a little too strong) the period of incubation does not exceed the limits stated in the resolution. Their objection attached rather to the too small importance, which, in a prophylactic point of view, the resolution seemed to attach to the exceptional cases, of which the most reasonable explanation consisted in admitting a longer period of incubation. As Professor Pettenkofer put it, the question was to be regarded from a prophylactic not a clinical point of view; adding, that from the latter "il accepterait la thèse d'une courte durée." On the other hand it was by no means intended, as the limiting word "almost" shows, by those who supported the resolution to deny the possible, nor the probable, existence of a longer period of incubation in some cases, nor that dangers might, though rarely, arise therefrom.

On the other hand 14 delegations asserted, while four denied,* the existence of means of disinfection, of the successful application of which there was reasonable probability. The vote on this latter question, however, must be interpreted by reference to a further discussion to which it gave rise, which showed that the objection on the part of the delegations which had voted in the negative, to admit the probable efficacy of disinfectants, had arisen chiefly, or at least in great part, from the influence they conceived an affirmative answer to the question would have in leading to a reliance being placed on disinfectants, to the prejudice of the precautions (which they deemed much more important) of simple hygiène. This had certainly been the furthest possible from the intention of those who had given the affirmative vote. A resolution, therefore, which should remove all ambiguity on this point was proposed, and unanimously adopted, as follows (I give the exact words of the resolution itself): "La science ne connait pas encore de moyens désin-" fectants certains et spécifiques; en conséquence, la Conférence " reconnaît une grande valeur aux mésures hygiéniques, telles que: " aëration, lotions profondes, nettoyage, &c., combinées avec l'emploi " des substances regardées actuellement comme désinfectantes."

No attempt was made at the present stage of proceedings to specify the various means of disinfection (as required by the last clause of the 11th question), the subject being held to belong in its details more properly to question 22 of the programme.†

Four sittings of the Conference had been occupied with the determination of these preliminary questions. The conclusions arrived at were, it will have been seen, essentially of accord with those arrived at by the Conference of Constantinople. At the last of these sittings the course to be adopted in considering the second part of the programme, the practical questions relating to Quarantine, was also discussed. It was determined that the questions relative to Land and River quarantines (questions 12–15) should be entertained in full Conference, but that the subject of Maritime Quarantine (questions 16–22) should, in the first instance, be referred to a committee, and discussed on the committee's report. It was further resolved that the questions relating to the establishment of an international sanitary commission (Part III. of Programme) should also, in the first instance, be referred to a committee. And the committees for the respective purposes were nominated.‡

II.—Questions of Quarantine.

The mode in which the questions connected with Quarantine were submitted for the consideration of the Conference differed from that which had been taken with regard to the scientific questions. The

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* In the Procès-verbaux the votes are recorded as 13 affirmative to 5 negative; M. Schleisner's vote, which was affirmative, having been erroneously entered as negative.

† In point of fact no enumeration of disinfectant substances, or recommendation as to special means of disinfection, was ever made by the Conference. The committee on Maritime Quarantines (see postea) in the Réglement attached to their report, suggested certain means as applicable to ships, and to passengers by ship, their clothes, and effects, but on discussion it was felt that the best course was to leave the choice of means of disinfection to the competent authority of each country.

‡ The committee on Maritime Quarantines, as first nominated, consisted of Messrs. Hirsch (Germany), d'Alber-Glanstätten (Austria), De Ring (France), Polak (Persia), and Seaton (Great Britain); but MM. De Ring and Polak declining, for reasons stated by them respectively, were replaced by MM. Semmola (Italy), and Van Cappelle (Holland). The committee on the subject of an International Commission consisted of MM. Lenz (Russia), Catinelli (Hungary), Marcovitz (Roumania), Kierulf (Norway), and Polak (Persia).

Conference of Constantinople, having established facts which fairly lead to the inference that a theoretically perfect Quarantine is capable of arresting cholera, had conceived and adopted a scheme for applying Quarantine, which would keep cholera, as it was supposed, eventually out of Europe. This was to be done by maritime quarantine stations on the Red and Caspian Seas and Persian Gulf, and by land quarantine stations on the Turco-Persian and Russo-Persian frontiers, and on the side of Boukhara. The scheme involved further complete temporary interruption (if necessary) of all communication between Egypt and any places in the basin of the Mediterranean. That Conference had also laid down general rules for quarantine (Régime Quarantenaire). Its scheme, as a general scheme, had never been put into execution, and indeed was in great part quite inexecutable; and it had this great defect, that it included no provision whatever for what, during the interval which had elapsed since the Conference had reported, had been the sole cause of anxiety with reference to cholera in Europe, viz., the spread of the disease in Europe itself.

The Conference of Vienna was not called upon specifically to review the several recommendations on Quarantine of the Conference of Constantinople, as it had been called on to review its conclusions on scientific matters; but certain broad general questions had been framed with the view of eliciting the opinion of the delegates assembled at Vienna as to the measures of restriction on the progress of cholera which were practicable, and likely to be efficacious, by land, by sea, or by river.

A.—*Land Quarantine.*

The 12th question on the Programme was:—"Des établissements de "quarantaine doivent-ils être construits sur terre contre le choléra?" Unless this question were answered in the affirmative, the following one, the 13th on the Programme, which had reference to the details of such establishments, fell to the ground. A resolution was proposed answering it in the negative, and adopted by a majority of 13 delegations to 4; two delegations abstaining from voting.* The terms of the resolution adopted set forth that, in view of the numerous modes of communication which existed and increased from day to day, land quarantines were inexecutable and useless; and that on this account, and on account of the serious damage they did besides to commercial interests, they ought to be abolished. (Considérant que les quarantaines de terre sont inexécutables et inutiles, vu les nombreux moyens de communication qui augmentent de jour en jour; considérant en outre qu'elles portent des atteintes graves aux intérêts commerciaux, la Conférence rejette les quarantaines de terre). Up to a certain point there was absolute unanimity of opinion in the Conference. No one contended that land quarantines on the continent of Europe, wherever a railway system had been established, were practicable; but objection was taken to the universal condemnation of land quarantines which the resolution implied. This objection was represented in three degrees (if I may so say) by three amendments successively put and negatived. The one widest from the resolution was that formulated by M. Milossavlevitch, the delegate for Servia, which, commencing by a recognition of the general utility of quaran-

* The delegations which voted against this view were those of France, Greece, Portugal, and Servia. The delegations which abstained from voting were those of Luxemburg and Switzerland. It should be stated, however, that the delegations of Turkey, Egypt, and Spain had not up to this time taken their places in the Conference.

tines, went on to say that, though land quarantines were not practicable in the centre of Europe, they ought to be established wherever topographical and social conditions admitted. This amendment received 4 votes against 13 negative; two delegations abstaining. The next, formulated by M. de Ring, delegate of France, was to the effect that the Conference was of opinion that land quarantines were in most cases impracticable, but that any States which deemed it possible to guard efficiently their land frontier by quarantines should have the liberty of doing so. This obtained 5 votes to 13 negative; one delegation only abstaining. The last amendment put, that of M. Orphanides, the delegate for Greece, proposed the maintenance of land quarantines in Greece and Turkey, on the ground that the reasons which called for the rejection of such quarantines in Europe generally did not apply to those countries. This proposal equally obtained five votes only; but of the 13 delegations which had rejected the former amendments, and which voted afterwards for the resolution originally proposed, eight abstained from voting on this amendment.* The effect was practically the same as though they had voted in the negative; an absolute majority of the delegations present being requisite for the adoption of any proposition.

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* The exceptional circumstances of Greece were ably put to the Conference by M. Orphanides; but no statement whatever of such circumstances was made on behalf of Turkey (the Turkish delegation, it should be explained, had not then arrived). On the other hand, the utter inexecutability and consequent inutility of the Turkish land quarantines were strongly stated by the Russian delegates, who, however, were amongst those who took no part in voting on this amendment. As M. Fauvel, one of the French delegation (who had not taken his place in the Conference at the time this question was discussed), has since insisted before the French Académie de Médécine on the practicability and value of these quarantines, it may not be amiss to add the following reliable description of them by Surgeon-Major W. H. Colvill, civil surgeon, Baghdad, who had himself been subjected to them:—"On my way from England last autumn, to rejoin my appointment, by "Russia and Persia, I had to spend 10 days in quarantine on the frontier at "Khanikin; and I can best give an idea of Turkish quarantine by trying to sketch "what I saw. Khanikin is a town of about 2,000 inhabitants. Here the river "Diayalah, crossed by a stone bridge, separates Turkey from Persia, and at the "Persian end, a plot of ground, bounded on one side by a canal, was marked out as "the quarantine camp, and here for two months before my arrival as many as 5,000 "travellers, Asiatic Russians, Afghans, and Persians, had at the same time been "encamped. Each company on coming in was supposed to pitch its tents a few feet "apart from the previous arrivals, though the people mixed freely together. I "arrived half an hour before midnight, and the stench from dead quadrupeds and "all manner of abominations was frightful; but that was not all, for if a person "were found dead from cholera his company had to begin the quarantine afresh, the "result being that no sooner was the breath out of the dying man than his friends "scraped a hole in the ground under the tent and pushed him in, while after them "another company would arrive, pitch on the same ground, and probably do the "same. In one case the friends were in such a hurry that they left the dead man's "beard protruding; the jackals came, and next morning his bare jawbones were "sticking through the ground. No account is kept of the arrivals, and no care "whatever is taken of the travellers, but that is no fault of the sanitary officers for "they have not the means . . . . . I was very much struck with the energy "and perseverance of the European officer here; but what could he do single-"handed amongst 5,000, constantly coming and going, men from the north, not "by any means in the best of temper, and whose language he could not under-"stand? The provisions purchased through intermediates were dear. This camp, "varying from 3,000 to 5,000, was simply a hot-bed of disease; while it did not "prevent cholera entering Turkey by that road, for it appeared at Kizil Robat, a "village of about 800 inhabitants, 16 miles on the way towards Baghdad, and for "10 days five to six people died daily; and yet this camp, behind the disease, was "kept up for a couple of months after that, while no quarantine was established "between Kizil Robat and the interior, that is towards Baghdad."—(Transactions of Medical and Physical Socioty of Bombay, N.S., No. xi. for 1871.)

The resolution, entirely condemnatory of land quarantine, was (as I have already stated) then adopted by the vote of 13 delegations to 4; two delegations abstaining.

B.—Maritime Quarantine.

It having been decided that the questions (14 and 15) which stood next in the Programme should be postponed until the subject of maritime quarantine had been discussed, the Conference next passed to that discussion, which proved an extremely animated one, and which occupied altogether nine sittings.

The discussion commenced of course with the consideration of the Report made by the Committee to whom the questions (16–22 in the Programme) relating to the subject had been referred, which Report was to the following effect:—

That maritime quarantines can only be of real use, as protective against cholera, in those ports which may be regarded as the chief points of irruption of that disease in its progress by sea towards Europe.

That, wherever instituted, they should be of the completest kind, and in conformity with the strictest rules of hygiène. That they should be international institutions.

That when cholera has broken through the chief points of irruption, quarantines in the ports of continental Europe are useless, inasmuch as the communications by land take from them all their value.

That, under these circumstances, there should be substituted in the ports of Europe for quarantine a rigorous medical inspection of every ship coming from an infected locality, in conformity with regulations which the Committee had prepared, and which it submitted to the Conference.

The general discussion of the principles involved in this Report was of the highest interest, and occupied three sittings. It was characteristic of the different stand-points from which this practical subject was approached at Constantinople and at Vienna, that, while the attention of the former Conference had, so far as it was concerned, been exclusively given to the establishment or maintenance of quarantine for the purpose of checking the progress of cholera by sea from Asia to Europe, it was with the question of the maintenance of quarantines in the ports of Europe itself that the Conference of Vienna was chiefly occupied. Little or no difference of opinion was manifested amongst those assembled at Vienna as to the utility of sea quarantines between Asia and Europe; but very great diversity of opinion was found to exist as to the advantage of such institutions in Europe itself, and it soon became evident in the progress of the debates that the Conference was divided into two camps, one comprising the majority of the delegations, who were favourable to their entire abolition in European ports, and the substitution of a system of medical inspection of vessels coming from infected places; the other, the minority, who were for maintaining them.

At the close of this general discussion, a proposal that the Report be reconsidered by the Committee with the addition of other members of the Conference entertaining views more favourable to quarantine having been rejected,* the Committee itself undertook to review its Report

* Though the Committee was unanimous in its Report, it need scarcely be said that it had not been nominated with any view to the representation in it of one set of opinions only. The Baron de Ring, the only member of the French delegation who was in Vienna when the Committee was appointed, was on the list first nominated, and on his declining to serve, a member of the Conference, whose opinions on the subject were unknown to the Conference, but generally believed to be favourable to maritime quarantine, was appointed to replace him.

before the Conference should proceed to consider and vote on the separate articles of it.

At the next sitting, (the 11th of the Conference, and 4th of the discussion on the Report,) Professor Hirsch, the reporter of the Committee, read a statement on its behalf as to the alterations and additions in the Report, which, in view of the discussion which had taken place, it deemed advisable; and the Conference then proceeded to the consideration of the Report, article by article.

The first article was as follows :—

" Les quarantaines dans les ports de mer ne peuvent offrir une protec-
" tion réelle et essentielle contre le choléra que dans ces ports qui
" peuvent être regardés comme les points principaux d'irruption du
" choléra dans sa marche maritime vers l'Europe." The Committee in its supplementary statement had proposed to make this more precise by additions which should specify the Caspian and the Red Seas, with the Canal of Suez, as the chief points of the maritime irruption of cholera, and should give a positive instead of an inferential approval of quarantine being established at Astrakan and Bakou on the Caspian Sea and at El Wesch on the Red Sea.

Another " rédaction," intended, as expressly stated, to imply exactly the same thing, was moved by M. Fauvel as follows :—

" En vue de prévenir de nouvelles invasions du choléra en Europe, la
" Conférence approuve, en principe, les mesures recommandées par la
" Conférence de Constantinople, et notamment les quarantaines maritimes
" dans la Mer Rouge, et sur le littoral de la mer Caspienne." After some discussion a conclusion was arrived at which consisted in the adoption of the article as originally proposed by the Committee with the addition of the words, " Dans cet ordre d'idées, la Conférence adopte les
" conclusions de la Conférence de Constantinople, quant aux quarantaines
" de la Mer Caspienne et de la Mer Rouge."* It was unfortunate that in the conclusion as thus expressed the words " en principe," which were part of M. Fauvel's proposal, were omitted. For it was the general scope and intention of the proposals made on this subject by the Conference of Constantinople, and not each individual recommendation of that Conference, which was approved. The individual recommendations were in fact never discussed, and I am satisfied that I am quite correct in stating that it never entered into the mind of any delegate present at the Conference at Vienna to revive, *e.g.*, the proposal made at Constantinople for international quarantine at the straits of Bab-el-Mandeb.

Of the second article of the Committee's Report, " Ces quarantaines
" devraient être instituées et organisées d'une manière complète et satis-
" faisante selon les maximes d'hygiène les plus rigoureuses. Elles devraient
" être des institutions internationales," the first part was unanimously adopted. The remainder relating to the internationality of these institutions was, after a short discussion, withdrawn.

To the third article of the Report, " Contre le choléra qui a franchi
" les points principaux de son irruption, les quarantaines dans les ports
" de l'Europe continentale sont inutiles, vu que les communications par

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* A continuation, as follows, of the additional proposal of the Committee, " Quant
" aux ports Ottomans de la Mer-Noire, vu la position géographique de la Turquie
" et ses relations spéciales avec les points principaux d'irruption du choléra, cette
" Puissance a la liberté d'établir des quarantaines. Les Dardanelles restent dans
" tous les cas ouvertes au commerce international," was, at the request of the Turkish delegation, withdrawn.

" terre leur ôtent toute valeur," an amendment was proposed by M. Fauvel as follows: " Quand le choléra règne en Europe, les quarantaines " maritimes perdent en général beaucoup de leur efficacité à raison des " communications par terre. Cependant on ne saurait dire qu'elles " soient devenues entièrement inutiles." It was on these respective proposals that what I may venture to call the critical vote of the Conference took place; the result being that the resolution contained in the Committee's report for the abolition of quarantine in continental Europe, when cholera was already in Europe, was adopted by the votes of 12 delegations to 8.*

The fourth article of the report, " Dans ces conditions, il convient " d'établir dans les ports de l'Europe, au lieu des quarantaines, une inspec- " tion sanitaire rigoureuse pour chaque navire provenant d'une localité " infectée selon le règlement ci-après," was also adopted; subject, of course, to the consideration of the details of the " Règlement." These underwent much discussion, in which they were considerably improved in form, but quite untouched in principle.† As finally agreed upon they will be found inserted *in extenso* in the Annex No. III. to this abstract. In principle, the provisions are the following:—

1. Local sanitary authorities in every port for the execution of these rules; such authorities to be kept always officially informed respecting cholera in other ports.

2. Immediate free pratique to all vessels arriving from non-infected ports, which vessels, on the oath of the captain, had not during their voyage touched at any intermediate suspected port, nor communicated directly with any infected ship, and on board which there had not been any suspected or confirmed case of cholera.

3. Medical inspection, as soon as possible after arrival, of all ships coming from suspected or infected ports, as well as of ships coming from non-suspected ports, but which had during the voyage touched at any suspected port or had direct communication with any infected ship, or on which there had been any suspicious case of cholera sickness or death.

4. Immediate free pratique to the ship and everything in it, when it appeared from this inspection that there was no actual cholera, or suspected cholera, on board; except when there *had been* any such cases during the voyage, under which circumstances the ship itself, the crew and passengers, their clothes, and goods were to undergo disinfection before being admitted to pratique.

5. If on the inspection there were found any case on board of cholera or suspected cholera, or any corpse of a person suspected to have died of cholera, (1) immediate removal of the sick (if any) to hospital, and immediate burial of corpses (if any) either in the sea with usual precau-

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* Of States of the first rank, France alone voted in the minority. The delegations of Great Britain, Germany, Russia, Austria, Hungary, and Italy were ranged on the side of the majority. Again, while the 12 States constituting the majority, and comprising (in addition to the six just enumerated) Belgium, Holland, Denmark, Sweden, Norway, and Persia, were all of them maritime States, three out of the eight States constituting the minority had no maritime relations whatever, viz., Luxemburg, Switzerland, and Servia. The remaining five States in the minority were France, Portugal, Greece, Turkey, and Egypt. It should be stated, however, that the Spanish delegation, which would have undoubtedly voted with the minority, had not arrived when this vote was taken.

† More than one attempt made by M. Fauvel to break in upon the principle of the system proposed met with discomfiture. On the other hand, his criticism was of great value in making more clear and concise the provisions of the Réglement as proposed by the Committee.

tions, or on land after disinfection; (2) disinfection of the crew and passengers who were well, and of their clothes and goods; and, (3) disinfection of the ship itself. All who were well to have free pratique, with their clothes and goods, as soon as the disinfection had been accomplished.

6. Free pratique to all merchandise, except to rags and other objects of a susceptible kind which must first undergo a radical disinfection.

This system, it will be seen, is identical in principle with that which has for some time been in practice in the United Kingdom; but I had notified to the Committee at an early stage that certain of the details proposed to be introduced into the "Règlement," as, *e.g.*, the *personal* disinfection of passengers on an infected ship who were themselves certified on arrival to be unaffected with cholera or diarrhœa, with some other provisions in regard to disinfection, were not carried out, and could not be carried out, in this country in the precise way the "Règlement" directed, and that with regard to these provisions, none of which appeared to me to be fundamental, reserve would have to be made in accepting the Règlement in question.*

In the discussion which had thus far taken place on the subject of maritime quarantine, two things had become evident: (1) that whatever might be the recommendation of the Conference in regard to the substitution of a system of medical inspection for one of quarantine in Europe, there were at least some maritime States which at present would not fall in with the recommendation, and that therefore "la parfaite conformité dans les dispositions à prendre &c.," which it was the desire of those who had convoked the Conference to establish, could not as yet be arrived at; and (2) that the views of at least some of the advocates of quarantine as applied to European ports had undergone modification tending to improvement in the practice, and that probably the most important and influential of all the States still supporting the quarantine system in Europe, viz., France, would be ready to discontinue at once that system, and substitute the system of medical inspection in its northern ports, though not in all its ports, and notably not in the ports in the Mediterranean. On these grounds, and with the object of arriving as far as possible at an understanding which might be the basis of such a convention as was desired, Professor Hirsch, in the name of the committee whose views had been adopted by the Conference, proposed a further committee for considering a scheme which might be accepted by those States which for the present should decline to accept the scheme which the Conference had approved. The proposal was adopted and a committee nominated for the purpose.†

The règlement quarantenaire, which the Committee prepared and which was accepted by the Conference, is given *in extenso* in Annex III. to this abstract. It modifies considerably the practice of quarantine as heretofore carried out in Europe generally.

1–4. *As to the duration of quarantine.*—In the case of ships coming from ports known to be infected, this is fixed at from one to seven days, according to circumstances, which period however may be extended to 10 days in the Eastern States of Europe, or elsewhere under exceptional

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* I think it may safely be affirmed that it was rather for the sake of countries which desired to pass from the quarantine system to the inspection system, than for countries in which, as in the United Kingdom, Sweden, Norway, Denmark, &c., such system was already in force, that the particular provisions relative to personal disinfection were introduced.

† This committee consisted of Messrs. Hirsch (Germany), d'Alber-Glanstätten (Austro-Hungary), Fauvel (France), Seaton (Great Britain), and Bartoletti (Turkey).

circumstances only. If the passage have lasted at least seven days, without there having been any suspicious case on board, the detention must be for one day only (24 hours), in other cases it may be from three to seven days, according to circumstances. In these cases, if the hygienic conditions of the vessel permit, this quarantine of observation may be performed on board, and no unloading of the vessel is required. If, however, there have been during the passage, or are found on the arrival of the ship, any cases of cholera or suspected cholera, the persons who are well are to be immediately removed and isolated in a lazaret or other place provided for the purpose, and there detained for seven full days from the date of their isolation. The sick are to be disembarked and cared for in an isolated locality, which must be quite separate from that destined for the persons under observation. After these removals, the ship itself, and all susceptible goods are to be rigorously disinfected. The persons who had necessarily remained on board are then to be the subjects of seven days' isolation and observation. In the case of ships coming from ports which are merely suspected, the duration of the quarantine of observation is not to exceed five days.

5. Ships loaded with emigrants or pilgrims, or which may be judged of especial danger to the public health, may be the subject of special precautions to be determined by the sanitary authority of the port of arrival.

6. Ships arriving at ports where there exist no efficient means of carrying out the above measures of quarantine are to receive all temporary succour that may be needed, but to be directed to the nearest port at which there is a proper establishment.

7. A ship starting from an infected port, but touching at an intermediate port, and there receiving free pratique without having performed quarantine, is to be regarded as coming from an infected port.

8. In all cases of mere suspicion, measures of disinfection may be employed when the sanitary authority thinks fit, but are not to be obligatory.

9. In any port in which cholera is already epidemic, measures of quarantine are inapplicable, and measures of disinfection should alone be practised.

The Conference added the following resolution, applicable alike whether the system of medical inspection or that of quarantine were the one adopted :—

The Captain, Medical Officer, and other Officers of ships are bound to furnish the sanitary authority of the port of arrival with every information as to any appearance or suspected appearance of disease among the crew and passengers. In case of false declaration, or of wilful concealment, they are liable to the penalties imposed by the sanitary laws of the respective countries. An international understanding on this subject would be most desirable.

The Conference also decided, in answer to question 22 of the Programme, that the modes of disinfection to be employed should be left to the competent authorities of each State.

And, at the suggestion of the delegates of Turkey, it expressed formally its desire that a penal law against sanitary offences might be promulgated in the Ottoman Empire.

C.—River Quarantine.

The Conference now returned to questions 13 and 14 of the Programme, which related to river quarantines. But the principles on which these questions were to be determined had been already all but completely discussed. It was obvious, for example, that to those parts of rivers which, whether situated exactly at their mouth or not, were really seaports, as London, Liverpool, Antwerp, the measures

decided on by each country as applicable to maritime quarantine exactly applied. It was equally obvious that all reasons which had been urged against restriction of communications by land must equally apply to rivers in their inland course. The present discussion therefore was limited almost entirely to exceptional circumstances affecting one river only, the Danube. It was with reference to this river that the second paragraph of the following conclusions, which were the conclusions of the Conference on this subject, was adopted :—

" All the reasons which have been advanced to show that land quarantines are impracticable and useless in preventing the propagation of cholera are equally valid against quarantines in the course of rivers.

" Still the measures recommended in the system of medical inspection approved by the Conference may be applied to ships having cholera on board.

" Ports at the mouths of rivers enter into the category of sea ports, and are to be so dealt with."

III.—The International Sanitary Commission.

The questions 23–26 in the Programme, which related to the institution of an International Commission for the purpose of opposing the spread of epidemics (à combattre les epidémies) had, as already stated, been referred in the first instance to a Committee; and, on the Committee's Report, the subject now came before the Conference for consideration. Two sittings were devoted to the discussion, which resulted in a very general, indeed almost unanimous, accord. The conclusions arrived at are given *in extenso* in Annex III. First, there was a universal recognition of the advantages which might be derived form the establishment of an International Commission for the further investigation of cholera and other epidemic diseases; but there was also almost complete unanimity of opinion that such Commission should be of a purely scientific character, without any administrative functions whatever. Further, it was agreed that such Commission might be consulted, by any of the Governments concerned, in regard to scientific questions, but in regard to such only. Its principal subject was to be the etiology and the prophylaxy of cholera; but it was to include the study of other epidemics also, yellow fever and plague being particularly contemplated. It was proposed that the Commission should prepare a progamme of scientific observation and research into the etiology and prophylaxy of these several epidemics, which should be carried out on a uniform plan by the several States; that it should publish the results of its work; and should have the faculty of proposing the convocation of international sanitary conferences. Secondly, it was proposed that the Commission should consist of medical men, delegated by the respective Governments assenting to the proposal, and should hold its sittings from time to time; but that there should be a central bureau, appointed and composed as the Commission itself should determine, always open. The Governments participating were to see, through their several sanitary authorities, that the international commission was supplied with all information relating to the subjects it had under investigation. Thirdly, the investigations in each country were to be of course undertaken by the sanitary authorities of the respective countries; but in any countries in which there was no organised sanitary service, the investigation might be undertaken by the international commission itself, with the consent of the Government concerned, either by means of physicians resident at fixed sanitary posts, or by temporary missions of inquiry; these in any case receiving their instructions direct from, and

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rendering their account direct to, the International Commission. The Conference left the subject of providing for the expenses of the proposed commission to be settled diplomatically between the Governments concerned.

It concluded this part of its work by the expression of its earnest desire to see instituted in Persia an international Council of Health analogous to the Councils of Health which act with such advantage at Constantinople and at Alexandria.

The particular kinds of questions relative to cholera which the international commission, if appointed, might, in the first instance, advantageously take up were indicated by various delegates in the discussions, and were some of them detailed by Professor Pettenkofer in a note which will be found attached to the third part of the Relevé des Conclusions in Annex III. But this note, it must be distinctly understood, was only meant as a *specimen* of questions waiting for solution; and was not in the least intended as even a sketch of a complete plan of work for the commission to undertake. The determining the exact commencement of cholera in each locality, and the tracing exactly its progress and termination were considered among the first duties of the Commission; the regular and systematic study of the meteorological and telluric conditions of certain specified places was another; a more exact and analytical study than we have had at present of the breaking out of cholera on board ships was another; determination of the precise duration of the incubation of cholera, determination of the value of disinfectants, &c., were all among the specimen subjects.

IV.—Quarantine against other Diseases than Cholera.

A short sitting was devoted to hearing several communications on yellow fever, but it was unanimously decided that this question should be reserved for the international sanitary commission which it was proposed to institute.

(Copy.)

ANNEX I.

Letter of Count Andrássy to the Austrian Ambassador at the Court of St. James.

Monsieur le Comte, Vienne, le 3 Mai 1874.

Depuis quelque temps déjà et de plusieurs côtés le désir s'est manifesté d'examiner de nouveau la question de savoir où et sous quelles conditions prennent naissance et s'étendent certaines épidémies qui, comme le choléra Asiatique, n'ont pas cessé, pendant les dernières années, de désoler le monde par leurs ravages, et d'entraver, par leurs perturbations, le développement des relations internationales. On a appuyé à cette occasion, sur la nécessité de faire généralement appliquer les remèdes les plus aptes pour préserver les populations contre les atteintes de ce fléau, et sur l'urgence d'étudier et de faire connaître de nouvelles mesures préventives et recommandées à cet effet par l'expérience. Le besoin s'est fait sentir, en même temps, de concerter entre les États intéressés des arrangements obligatoires qui auraient pour but d'amener une parfaite conformité dans les dispositions à prendre pour se prémunir contre ce danger commun, de concentrer et de raffermir par là les moyens de se protéger contre l'invasion de ces maladies, et

d'écarter aussi bien la confusion qui a envahi, peu-à-peu, le terrain, des principles hygiéniques en vigueur par rapport à ces épidémies et aux barrières qu'on leur oppose, que de faire disparaître les causes qui ne portent que trop souvent le trouble dans les transactions commerciales.

L'augmentation continuelle des relations commerciales entre les différents pays, et la variété des moyens de communication par lesquels le commerce est entretenu, prouvent tous les jours d'avantage, l'utilité, voire même la nécessité, d'établir des règles identiques destinées à régir ces rapports, et de les sanctionner par des conventions internationales. De nombreuses expériences démontrent les avantages de pareils arrangements. Si le libre exercice de la souveraineté territoriale est limité, en quelque sorte, par les conventions de ce genre, il est incontestable que le profit que chaque état en retire, l'emporte de beaucoup sur cet inconvénient, qui n'est qu'apparent. La pratique démontre aussi les grands désavantages qui résultent, p. e., dans le domaine de l'hygiène publique, de la divergence des principes d'après lesquels on combat, dans l'un ou dans l'autre état, les épidémies générales se propageant de pays en pays sous la tutèle, pour ainsi dire, de ces principes. Cette vérité a dès 1866 été reconnu par les Gouvernements qui ont pris part à la Conférence Sanitaire Internationale réunie à Constantinople et à laquelle on avait assigné pour objet des questions semblables à celles que nous proposons de résoudre, et un but analogue à celui que nous voulons atteindre. Des hommes de la science sérieux et compétents n'ont pas hésité dans les délibérations de la dite Conférence, à proclamer les mêmes idées auxquelles nous nous sommes associés aujourd'hui. Les conclusions adoptées par cette Conférence renferment des conseils précieux qui ne sont peut-être affectés que d'un seul défaut, celui de n'avoir jamais été mis en pratique.

Il s'agit, donc, aujourd'hui, dans cet ordre d'idées, de réviser, jusqu'à un certain point au moins, les délibérations engagées et les résolutions prises à ce sujet à Constantinople, de les vérifier et de les compléter par les idées et expériences acquirés, et surtout, d'en assurer l'exécution, et d'arrêter à cet effet entre les États intéressés, une convention sanitaire internationale qui réponde à tous besoins de la situation actuelle.

Nous avons cru ne pas devoir nous montrer indifférents à ces demandes renouvelés récemment encore et avec insistance, ainsi qu'en font foi les résolutions du troisième Congrès International de Médécine réuni en l'année passée. Guidés par ces considérations, nous nous sommes adressés aux Puissances intéressés, afin d'être informés si elles sont disposées à envoyer des délégués à une conférence sanitaire internationale, convoquée à Vienne, dans le but de délibérer et de décider sur certaines questions de réforme du service sanitaire international. Nous avons eu la satisfaction de pouvoir constater que l'initiative prise par nous à cet égard a été saluée de tout côté avec un vif empressement, et que nos propositions ont été accueillies favorablement par tous les Gouvernements auxquels nous nous étions adressés. Nous avons pensé devoir, dans ces circonstances, faciliter la tâche importante dévolue à la Conférence en faisant élaborer, par une Commission spéciale, un programme de ces travaux futurs, qui traçât dès à présent, sans limiter la liberté des appréciations et l'indépendance nécessaire de ces membres, le cadre des questions à traiter, et qui indiquât le but qu'on se propose atteindre. En prenant d'avance connaisance de ce programme, on sera mis en état de pouvoir faire soigneusement étudier ces questions, et il sera possible de munir les délégués d'instructions précises et assez étendues pour procéder plus tard en pleine connaissance de cause, aux délibérations et à la conclusion des arrangements internationaux.

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Aujourd'hui ces travaux préparatoires étant terminés, et pour ne pas retarder plus longtemps la réalisation d'un projet dont le besoin se fait sentir d'une manière impérieuse, il ne nous reste qu'à inviter officiellement tous les États intéressés dans cet affaire, à envoyer leurs délégués, munis des pleins pouvoirs nécessaires, à la Conférence Sanitaire Internationale qui est convoquée à Vienne pour le 15 Juin prochaîn, et qui sera chargée de délibérer et de décider sur les questions indiquées dans le programme. Les délégués envoyés à cette Conférence seront chargés, en outre, de s'entendre sur les bases d'un arrangement à conclure à ce sujet, et d'arrêter une convention sanitaire internationale destinée a règler les relations futures des États intéressés par rapport aux différentes questions traitées dans la Conférence. La ratification de cette Conférence devrait être réservée aux Gouvernements dont les délégués interviendraient à cette Conférence, et la faculté d'y accéder plus tard, aux États qui n'auraient pas pris part aux négociations.

Nous sommes ensuite d'avis qu'il faudrait abandonner aux Gouvernements qui prennent part à la Conférence, le soin de fixer le nombre de leurs délégués, tout en maintenant le principe que les délégués de chaque État ne pourraient disposer en votant que d'une seule voix.

Je vous prie, M. le Comte, de vouloir bien adresser cette invitation officielle au Gouvernement auprès duquel vous avez l'honneur d'être accrédité, de lui exposer les vues et les intentions qui nous animent dans cette affaire, et de lui communiquer le programme ci-joint de la Conférence. Nous vous plaisons à espérer que la Gouvernement de la Grande Bretagne reconnaîtra les valeurs des considérations qui nous ont engagés à cette démarche.

Veuillez nous faire connaître aussitôt que possible, les noms des délégués qui le Gouvernement de Grande Bretagne se propose d'envoyer à la Conférence, et recevoir, M. le Comte, l'assurance de ma considération la plus distinguée.

(Signé) Andrássy.

ANNEX II.

Programme de la Conférence Sanitaire Internationale convoquée à Vienne.

Questions préalables.

Si l'on se reporte aux débats bien connus de la Conférence sanitaire internationale de Constantinople en 1866, il importe avant tout d'examiner et de résoudre les questions préalables suivantes :

1. Le choléra Asiatique susceptible de s'étendre (épidémique) ne se développe-t-il spontanément que dans l'Inde, et est-ce toujours du dehors qu'il arrive, quand il éclate dans d'autres pays ? Ou bien revêt-il aussi le caractère endémique dans d'autres pays que l'Inde ? dans ce cas quels sont ces pays ?
2. Le choléra est-il transmissible par l'homme ?
3. Le choléra peut-il être propagé par des effets, qui, provenant d'un lieu infecté, ont servi à l'usage et spécialement par ceux qui ont appartenu à des cholériques ?
4. Peut-il être propagé par des comestibles ?
5. Peut-il être importé par des animaux vivants ?
6. ou par le transport de marchandises ?
7. ou, enfin, par les cadavres des cholériques ?
8. Le choléra peut-il se propager au loin par l'atmosphère seule ?
9. L'air frais arrivant du dehors aux agents donnant naissance ou propageant le choléra, et les aërant, ou bien l'isolement de ces agents de

l'air extérieur constituent-ils des éléments ayant ou non une influence sur le caractère contagieux de choléra ?

10. Quand il y a contagion, quelle est la durée de l'incubation ?

11. Connaît-on des moyens ou des procédés de désinfection grâce auxquels le principe générateur ou contagieux du choléra peut sûrement ou avec quelque chance de succès être détruit et perdre de son intensité ?

Dans le cas affirmatif quels sont ces moyens ?

Questions sur les Mesures de Quarantaine en Temps de Choléra.

12. Des établissements de quarantaine doivent-ils être construits sur terre contre le choléra ?

13. Dans ce cas :

(*a.*) Où seront-ils placés ?

(*b.*) Quand et dans quelles conditions ces constructions doivent-elles se faire ?

(*c.*) Quelles seraient les conditions à remplir sous le rapport des bâtisses et sous celui de l'organisation administrative ?

(*d.*) Comment et par quels moyens est-il possible d'empêcher l'accès dans un pays par une autre voie que celle protégée par des établissements de quarantaine ?

14. Des établissements de quarantaine contre le choléra doivent-ils être aussi construits sur les bords des fleuves ?

15. Dans le cas affirmatif (comme au § 13) ?

16. Doit-on construire des établissements de quarantaine maritimes ? ou conserver ceux qui existent ?

17. Si tel doit être le cas (comme au § 13) ?

18. Quels sont les principes qui doivent être adoptés envers les personnes

(*a.*) pour les admettre immédiatement à la libre pratique ?

(*b.*) pour leur faire subir une quarantaine d'observation ?

(*c.*) ou une quarantaine rigoureuse ? (Établissements de quarantaine, lazaret.)

19. Quelle doit-être, pour les personnes saines (passagers, marins, etc.), la durée

(*a.*) de la quarantaine d'observation ? et,

(*b.*) de la quarantaine rigoureuse proprement dite ?

quelle est pour les personnes atteintes du choléra, la durée du séjour au lazaret ?

20. Sous quelles conditions et dans quelle mesure peut-on comprendre, pour des navires, la durée de la traversée dans le temps fixé pour la quarantaine ?

21. Quels sont les principes qui seront appliquées

(*a.*) aux effets qui servent à l'usage de personnes,

(*b.*) aux animaux vivants,

(*c.*) aux marchandises,

(*d.*) aux comestibles,

(*e.*) aux navires, wagons, voitures, etc.,

pour les admettre à la libre pratique sans qu'ils n'aient été désinfectés ou après qu'ils l'ont été ?

22. En quoi consiste la désinfection

(*a.*) des personnes,

(*b.*) des effets à leur usage,

(*c.*) des animaux vivants,

(*d.*) des marchandises,

(*e.*) des moyens de transport ? (Moyens, mode et durée de l'application.)

Questions au sujet de l'Institution d'une Commission Internationale appelée à Combattre les Epidémies.

23. Des postes sanitaires permanents, ou temporaires et internationaux, qui auraient à s'occuper d'étudier les épidémies et de rechercher les moyens d'empêcher la propagation, doivent-ils être établis pour tous les genres d'épidémie ou seulement pour certaines catégories, et dans ce dernier cas pour quelles ?

24. Dans le cas affirmatif :

(*a.*) où ces postes sanitaires seront-ils établis ?
(*b.*) quelle organisation leur donnera-t-on ?
quel sera leur personel ?
en quoi consisteront les localités ?
les ressources scientifiques ?
quels seront les appointements ?
comment se procurera-t-on les fonds nécessaires ?
(*c.*) qui aurait à nominer le personnel ?
(*d.*) de quelle autorité relèveront ces postes ?
(*e.*) d'après quels principes et par qui leurs instructions seront-elles rédigées ?

5. Une Commission sanitaire permanente ou temporaire et internationale qui aurait à s'occuper d'étudier les épidémies et de rechercher les moyens d'empêcher leur propagation doit-elle être établie pour tous les genres d'épidémie ou seulement pour certaines catégories, et, dans ce cas, pour lesquelles cette Commission aurait-elle en même temps à décider certaines questions de quarantaine internationales dans des cas donnés et quels sont ces cas ?

26. Dans le cas affirmatif :

(*a.*) où doit être le siège de cette Commission ?
(*b.*) quelle doit en être l'organisation,
le personnel,
les établissements,
les ressources scientifiques,
les appointements,
et comment fera-t-on les fonds ?
(*c.*) qui aurait à en désigner les membres et qui à choisir le reste du personnel ?
(*d.*) quelle sera la position officielle à donner à cette Commission et quelle sera sa sphère d'action ?

Questions relatives à des Mesures de Quarantaine à prendre contre des Épidémies pouvant régner parmi les Hommes et qui sont autres que le Choléra.

Il reste réservé à la Conférence Sanitaire Internationale de faire figurer dans son programme, outre les mesures de quarantaine à prendre contre le choléra, de même aussi celles qu'elle jugera utile d'arrêter contre d'autres épidémies susceptibles de régner parmi les hommes.

ANNEX III.

Relevé des Conclusions adoptées par la Conférence Sanitaire Internationale de Vienne.

Première Partie.

Questions Scientifiques.

I.

Origine et Genèse du Choléra; Endémicité et Epidémicité de cette Maladie dans l'Inde.

Le cholera asiatique, susceptible de s'étendre (épidémique), se développe spontanément dans l'Inde, et c'est toujours du dehors qu'il arrive, quand il éclate dans d'autres pays.

Adopté à l'unanimité.

Il ne revêt pas le caractère endémique dans d'autres pays que l'Inde.

Adopté à l'unanimité.

II.

Questions de Transmissibilité.

1°. *Transmissibilité par l'Homme.*

La Conférence accepte la transmissibilité du choléra par l'homme venant d'un milieu infecté; elle ne considère l'homme comme pouvant être la cause spécifique, qu'en dehors de l'influence de la localité infectée; en outre, elle le regarde comme le propagateur du choléra, lorsqu'il vient d'un endroit où le germe de la maladie existe déjà.

Adopté à l'unanimité.

2°. *Transmissibilité par les Effets à Usage.*

Le choléra peut être transmis par les effets à usage provenant d'un lieu infecté, et spécialement par ceux qui ont servi aux cholériques; et même il resulte de certains faits, que la maladie peut être importée au loin par ces mêmes effets renfermés à l'abri du contact de l'air libre.

Adopté à l'unanimité.

3°. *Transmissibilité par les Aliments et les Boissons.*

(*a.*) *Aliments :*

La Conférence, ne possédant pas de preuves concluantes pour la transmission du choléra par les aliments, ne se croit pas autorisée à prendre une décision à cette égard.

Résultat du vote : 11 oui, 7 non.

(*b.*) *Boissons :*

Le choléra peut être propagé par les boissons, particulièrement par l'eau.

Adopté à l'unanimité.

4°. *Transmissibilité par les Animaux.*

On ne connaît aucun fait probant de la transmissibilité du choléra par les animaux à l'homme, mais il est très-rationnel d'en admettre la possibilité.

Résultat du vote : 10 oui, 2 non, 6 abstentions.

5 *De la Transmissibilité par les Marchandises.*

Tout en constatant, à l'unanimité, l'absence de preuves à l'appui de la transmission du choléra par les marchandises, la Conférence a admis la possibilité du fait dans certaines conditions.

Resultat du vote : 13 oui, 5 abstentions.

6°. *Transmissibilité par les Cadavres Cholériques.*

Bien qu'il ne soit pas prouvé par des faits concluants que les cadavres de cholériques puissent transmettre le choléra, il est prudent de les considérer comme dangereux.

Adopté à l'unanimité.

7°. *Transmissibilité par l'Atmosphère seule.*

Aucun fait n'est venu prouver jusqu'ici que le choléra puisse se propager au loin par l'atmosphère seule, dans quelque condition qu'elle soit ; en outre, c'est une loi, sans exception, que jamais une épidémie de choléra ne s'est progagée d'un point à un autre dans un temps plus court que celui nécessaire à l'homme pour s'y transporter.

L'air ambiant est le véhicule principal de l'agent générateur du choléra ; mais la transmission de la maladie par l'atmosphère reste, dans l'immense majorité des cas, limitée à une distance très-rapprochée du foyer d'émission. Quant aux faites cités de transport par l'atmosphère à un ou plusieurs milles de distance, ils ne sont pas suffisamment concluants.

Adopté à l'unanimité.

8°. *Action de l'Air sur la Transmissibilité.*

Il résulte de l'étude des faits qu'à l'air libre le principe générateur du choléra perd rapidement son activité morbifique, telle est la règle ; mais dans certaines conditions particulières de confinement, cette activité peut se conserver pendant un temps indéterminé.

Le choléra peut être transmis par les effets à usage provenant d'un lieu infecté, et spécialement par ceux qui ont servi aux cholériques ; et même il résulte de certains faits que la maladie peut être importée au loin par ces mêmes effets renfermés à l'abri du contact de l'air libre.

Les grands déserts sont une barrière très-efficace contre la propagation du choléra, et il est sans exemple que cette maladie ait été importée en Egypte ou en Syrie, à travers le désert, par les caravanes parties de la Mecque.

Adopté à l'unanimité.

III.

Durée de l'Incubation.

Dans presque tous les cas, la période d'incubation, c'est à dire le temps écoulé entre le moment où un individu a pu contracter l'intoxication cholérique et le début de la diarrhée prémonitoire ou du choléra confirmé, ne dépasse pas quelques jours. Tous les faits cités d'une incubation plus longue se rapportent à des cas qui ne sont pas concluants, ou bien parce que la diarrhée prémonitoire a été comprise dans la période d'incubation, ou bien parce que la contamination a pu avoir lieu après le départ du lieu infecté.

L'observation montre que la durée de la diarrhée cholérique, dite prémonitoire—qu'il ne faut pas confondre avec toutes les diarrhées qui existent en temps de choléra—ne dépasse pas quelques jours.

Les faits cités comme exceptionnels ne prouvent pas que les cas de diarrhée qui se prolongent au-delà appartiennent au choléra, et soient susceptibles de transmettre la maladie, quand l'individu atteint a été soustrait à toute cause de contamination.

Résultat du vote : 13 oui, 1 non, 4 abstentions.

IV.

Questions de la Désinfection.

1°. Connaît-on des moyens ou des procédés de désinfection, grâce auxquels le principe générateur ou contagieux du choléra peut sûrement être détruit ou perdre de son intensité ?

Résultat du vote : 12 non, 7 abstentions.

2°. Connaît-on des moyens ou des procédés de désinfection, grâce auxquels le principe générateur ou contagieux du choléra peut avec quelque chance de succès être détruit ou perdre de son intensité ?

Resultat : 13 oui, 5 non.

3°. La science ne connaît pas encore de moyens désinfectants certains et spécifiques : en conséquence, la Conférence reconnaît une grande valeur aux mesures hygiéniques telles que : aëration, lotions profondes, nettoyage, etc., combinées avec l'emploi des substances regardés actuellement comme désinfectants.

Adopté à l'unanimité.

DEUXIÈME PARTIE.

Questions des Quarantaines.

I.

Quarantaines de Terre.

Considérant que les quarantaines de terre sont inexécutables et inutiles, vu les nombreux moyens de communication qui augmentent de jour en jour ; considérant en outre qu'elles portent des atteintes graves aux intérêts commerciaux, la Conférence rejette les quarantaines de terre.

Résultat du vote : 13 oui, 4 non, 2 abstentions.

II.

Quarantaines Maritimes.

I.

Mesures à prendre en dehors de l'Europe

En vu de prévenir de nouvelles invasions du choléra en Europe, la Conférence approuve les mesures recommandées par la Conférence de Constantinople, notamment les quarantaines dans la Mer-Rouge et dans la Mer-Caspienne.

Ces quarantaines devront être instituées et organisées d'une manière complète et satisfaisante, selon les maximes d'hygiène les plus rigoureuses.

II.

Mesures à prendre dans les Ports de l'Europe.

Lorsque le choléra a fait invasion en Europe, la Conférence recommande le système d'inspection médicale, mais pour les États que préfèrent maintenir les quarantaines, elle établit les bases d'un règlement quarantenaire.

A. *Système de l'Inspection médical.*

1. Il y aura, dans chaque port ouvert au commerce, une autorité sanitaire composée de médecins et d'administrateurs, aidés par un personnel de service. Le nombre des membres de ces différentes catégories variera dans chaque port selon l'importance du mouvement maritime, mais il devra être suffisant pour pouvoir accomplir dans toutes les circonstances et avec rapidité les mesures exigées pour les navires, les équipages, et les passagers.

Le chef de ce service sera toujours tenu au courant par des communications officielles de l'état sanitaire de tous les ports infectés de choléra.

2. Les navires provenant d'un port net, n'ayant (d'après la déclaration, sous serment, du capitaine) touché dans leur voyage aucun port intermédiaire suspect, ni communiqué directement avec aucun navire suspect, et sur lesquels durant le voyage on n'aura constaté aucun cas suspect ou confirmé de choléra, auront la libre pratique.

3. Les navires provenant d'un port suspect ou infecté et ceux provenant de ports non suspects, mais qui ont eu dans le voyage des rélations intermédiaires compromettantes, ou sur lesquels il y a eu durant la traversée des cas suspects de maladie ou de mort de choléra, seront soumis dès leur arrivée à une visite médicale rigoureuse pour constater l'état sanitaire du bord.

4. S'il résulte de la visite médicale qu'il n'existe parmi les hommes de l'equipage et les passagers aucun cas suspect de maladie ou de mort de choléra, le navire, avec tout ce qu'il renferme, sera admis à la libre pratique. Mais si des cas de choléra ou de nature suspecte se sont manifestés à bord durant la traversée, le navire, les vêtements et les effets à usage des gens de l'équipage et des passagers seront soumis d'abord à une désinfection rigoureuse, bien que l'équipage et les passagers aient été trouvés indemnés du choléra dans le port.

5. S'il y a à l'arrivée des cas suspects de maladie ou de mort de choléra, les malades seront immédiatement transportés dans un lazaret ou dans un local isolé pouvant en tenir lieu et prêt à les recevoir; les cadavres seront jetés à la mer avec les précautions d'usage ou ensevelis après avoir été convenablement désinfectés; les passagers et l'equipage seront soumis à une désinfection rigoureuse, et le navire lui-même sera désinfecté, après qu'on en aura éloigné les passagers et la partie du personnel de l'équipage qui n'est pas nécessaire à la désinfection et à la surveillance.

Les vêtements et les effets à usage des malades et même des passagers sains seront assujettis, dans un local spécial et sous le contrôle rigoureux de l'autorité sanitaire, à une radicale désinfection.

Après cette désinfection, les effets seront rendus aux passagers et aux personnes de l'équipage qui seront admis à libre pratique.

6. Les marchandises débarquées seront admises à libre pratique, à l'exception des chiffons et autres objets susceptibles, que l'on devra soumettre à une radicale désinfection.

B. Système des Quarantaines.

Provenances de Ports Infectés.

1°. Les provenances de ports infectés sont soumises à une observation variant de 1 à 7 jours pleins selon les cas. Dans les ports des États orientaux de l'Europe, et ailleurs dans certains cas exceptionnels seulement, la durée de l'observation peut être portée à 10 jours.

Navires suspects.

2°. Si l'autorité sanitaire a la preuve suffisante qu'aucun cas de choléra ou de nature suspecte n'a eu lieu à bord durant la traversée, la durée de l'observation est de 3 à 7 jours, à dater de l'inspection médicale.

Si dans ces conditions la traversée a duré au moins 7 jours, l'observation est réduite à 24 heures pour les constatations et les désinfections qui pourraient être jugées nécessaires.

Dans les cas de cette catégorie, la quarantaine d'observation peut être purgée à bord, tant qu'aucun cas de choléra ou d'accidents suspects ne s'est manifesté, et si les conditions hygiéniques du navire le permettent.

Dans ces cas le déchargement du navire n'est point obligatoire.

Navires infectés.

3°. En cas de choléra ou d'accidents suspects soit durant la traversée, soit après l'arrivée, la durée de l'observation pour les personnes non malades est de 7 jours pleins, à dater de leur isolement dans un lazaret ou dans un endroit pouvant en tenir lieu.

Les malades sont débarqués et reçoivent les soins convenables dans un local isolé et séparé des personnes en observation.

Le navire et tous les objets susceptibles sont soumis à une désinfection rigoureuse, après laquelle les personnes restées à bord du navire sont assujetties à une observation de 7 jours.

Provenances de Ports suspects.

4°. Les provenances des ports suspects, c'est-à-dire voisins d'un port où règne le choléra et ayant des relations libre avec ce port, peuvent être soumises à une observation, qui n'excédera pas 5 jours, si aucun accident suspect ne s'est produit à bord.

Dispositions diverses.

5°. Les navires chargés d'émigrants, de pélerins, et, en général, tous les navires jugés particulièrement dangereux pour la santé publique, peuvent, dans les conditions mentionnées précédemment, être l'objet de précautions spéciales que déterminera l'autorité sanitaire du port d'arrivée.

6°. Lorsque les ressources locales ne permettent pas d'exécuter les mesures ci-dessus prescrites, le navire infecté est dirigé sur le plus prochain lazaret, après avoir reçu tous les secours que réclame sa position.

7°. Un navire provenant d'un port infecté, qui a fait escale dans un port intermédiaire et y a reçu libre pratique sans avoir fait de quarantaine, est considéré et traité comme provenant d'un port infecté.

8°. Dans les cas de simple suspicion, les mesures de désinfection ne sont pas de rigueur, mais elles peuvent être pratiquées toutes les fois que l'autorité sanitaire le juga convenable.

9°. Un port où le choléra règne épidémiquement ne doit plus appliquer de quarantaine proprement dite, mais doit pratiquer seulement des mesures de désinfection.

C.—Dispositions Communes aux Deux Systèmes.

(*Inspection médicale.—Quarantaines.*)

1. Le capitaine, le médécin, et les officiers du bord sont tenus de déclarer à l'autorité sanitaire tout ce qu'ils peuvent savoir d'apparition suspecte de maladie parmi l'équipage et les passagers.

En cas de fausse déclaration ou de réticence calculée ils sont passibles des peines édictées par les lois sanitaires. Il serait à désirer qu'une entente internationale s'établit à ce sujet.

2. La désinfection soit des effets à usage, soit des navires, sera opérée par les procédés que les autorités compétentes de chaque pays jugeront les mieux appropriés aux circonstances.

La Confèrence adopte : 21 oui, 1 abstention.

La Confèrence exprime le vœu qu'une loi pénale applicable aux contraventions sanitaires soit édictée dans l'Empire Ottoman.

Fesultat du vote : 15 oui, 4 non, 3 abstentions.

III.

Quarantaines Fluviales.

Routes les raisons produites, pour démontrer que les quarantaines par terre sont impracticables et inutiles pour empêcher la propagation du choléra, sont également valables pour les quarantaines dans le cours des fleuves.

Toutefois les mesures recommandées dans le systême de l'inspection médicale adopté par la Conférence peuvent y être appliquées aux navires ayant le choléra à bord.

Quant aux ports de l'embouchure, its rentrent dans la catégorie des ports maritimes, et par conséquent les mêmes mesures y sont applicables.

Resultat du vote : 19 oui, 3 abstentions.

TROISIÈME PARTIE.

Projet de Création d'une Commission Internationale Permanente des Epidémies.

I.

(*But.—Utilité.*)

Il sera institué à Vienne une Commission Sanitaire Internationale Permanente, ayant pour objet l'étude des maladies épidémiques.

II.

(*Attributions.*)

Les attributions de cette Commission seront purement scientifiques ; elle pourra être consultée dans les questions scientifiques.

La Commission aura pour tâche principal l'étude du choléra, au point de vue de l'étiologie et de la prophylaxie.

Néanmoins elle pourra comprendre dans ses études les autres maladies épidémiques.

Á cet effet, elle tracera un programme comprenant les recherches devant être entreprises d'une manière uniforme par tous les États contractants, sur l'étiologie et la prophylaxie du choléra et des autres maladies épidémiques.*

Elle fera connaître le résultat de ses travaux.

Enfin elle pourra proposer la convocation de conférences sanitaires internationales, et elle sera chargée d'élaborer le programme de ces conférences.

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* Voir quelques exemples à l'Annexe.

III.

(*Composition.—Fonctionnement.*)

La commission sera composée de médecins délégués par les Gouvernements participants. Il y aura au siége de la Commission un bureau à résidence fixé, chargé de centraliser les travaux et de donner suite aux délibérations de la Commission générale. La nomination et la composition de ce bureau sont laissées aux soins de la Commission générale. Les Gouvernements des États participants donneront à leurs autorités sanitaires et à leurs conseils d'hygiène publique les instructions nécessaires pour fournir à la Commission internationale tous les renseignements rélatifs aux questions qui rentrent dans le cercle de ses études.

Dans les pays où des conseils sanitaires internationaux sont établis, ceux-ci fourniront tous les renseignements qu'ils possèdent, et prescriront les recherches nécessaires.

IV.

(*Voies et Moyens.*)

Les frais nécessités pour le fonctionnement de la Commission internationale seront répartis entre les divers États intéressés, et seront réglés par voie diplomatique.

V.

(*Postes et Missions.*)

Dans les pays où il n'y a pas de service sanitaire organisé, les études seront faites, avec l'assentiment du Gouvernement local, par les missions temporaires on par des médicins en résidence fixe.

Ces missions et ces postes sanitaires fixes, institués par voie internationale, seront créés d'après les indications de la Commission internationale, recevront d'elle leurs instructions, et lui rendront compte de leurs travaux.

(*Article Additionel.*)

Il serait à désirer qu'un conseil de santé international, analogue à ceux qui fonctionnent avec tant d'avantage à Constantinople et à Alexandrie, fût institué en Perse.

Un tel conseil contribuerait beaucoup par l'autorité de ses avis, donnés en connaissance de cause, à améliorer les conditions sanitaires de ce pays, et serait en même temps un puissant moyen de protection contre l'invasion des épidémies en Europe.

Annexe à l'Article II. du Projet de Création d'une Commission Internationale des Épidémies.

Comme premières recherches, la Commission pourrait s'occuper des questions suivantes :—

1°. L'étude régulière et suivie de la quantité de pluie et de la quantité d'eau d'évaporations pendant l'année dans les stations suivantes :—

Bender Bouschir,	Alexandrie,
Ispahan,	Astrakan,
Téhéran,	Bakou,
Tauris,	Tiflis.*
Suez,	

* Voir la proposition de Monsieur de Pettenkofer.

2°. L'étude scientifique des conditions telluriques de ces différentes villes.

3°. L'examen plus exact, et entrepris avec plus d'esprit d'analyse qu'il ne l'a été jusqu'ici de l'apparition et de la propagation du choléra sur les vaisseaux.

Les recherches porteront provisoirement sur quelques lignes très-fréquentées* :—

Calcutta—Maurice.
Alexandrie—Malte.
Alexandrie—Marseille.
Southampton—Amérique du Nord.
Hambourg—New York.
Singapoor—Aden—Djeddah.
Calcutta—Aden—Djeddah.
Bombay—Aden—Djeddah.
Naples—Vénise.

4°. Faire constater les premiers cas de chaque épidémie de choléra qui éclate dans les différentes localités et spécialement dans les ports maritimes de l'Europe, et réunir tous les éléments d'une statistique complète relative à la marche du choléra en Europe.

5°. Déterminer par des faits scientifiques la durée précise de l'incubation du choléra.

Adopté à l'unanimité.

QUATRIÈME PARTIE.

La Conférence a entendu plusieurs communications sur la fièvre jaune, mais elle a décidé, à l'unanimité, que cette question devait être renvoyée à la Commission internationale permanente des épidémies dont elle a proposé la création.

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* Voir Pettenkofer.

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